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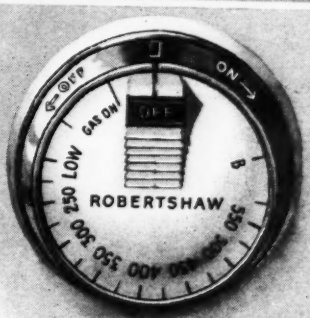

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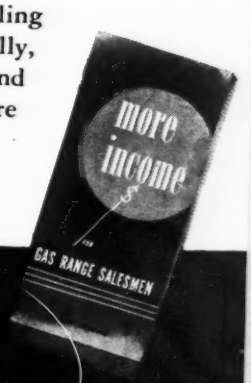

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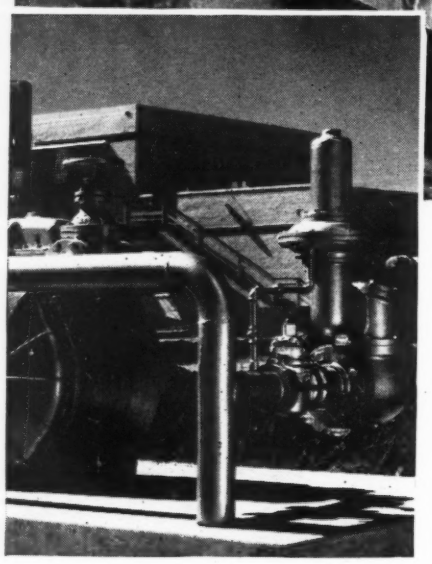

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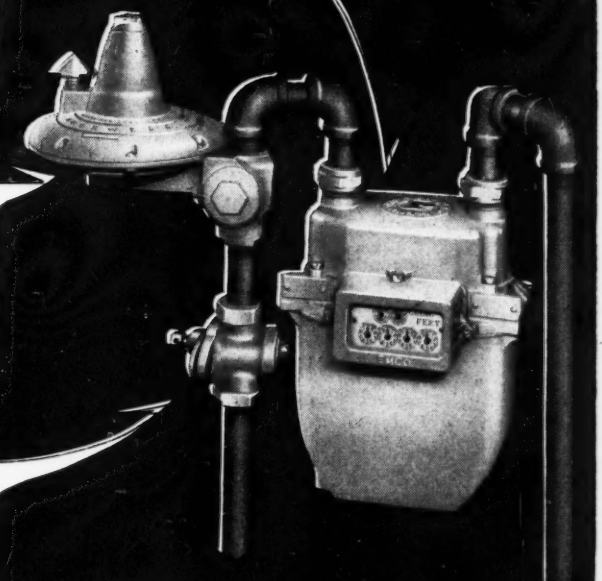

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Twenty-Third Year of Publication

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Thermally Thinking

By ELLIOTT TAYLOR

Transmission Hurdles

NEW England gas men and their customers, aspiring to the early introduction of natural gas into that northeastern area, may have felt a few scattered drops of the cold water of realism bounce off their bare hopes as they listened to Paul R. Taylor of Stone and Webster Service Corp. discuss before a New England Gas Association annual business meeting the possibilities and the problems involved in the transportation of Texas fuel to their home grounds. He didn't say that natural gas would not eventually reach that market, and he did not imply that it would be forever in getting there; but he certainly sobered any in his audience who may have been dreaming of natural gas for the coming winter or even the winter after.

It is trite to observe that the introduction of natural gas into any area boils down chiefly to a question of economics, yet this is precisely the case. And even the economics of the venture are often more than a little complicated. In Taylor's opinion, natural gas may be laid down in the New England area for from 35 cents to 40 cents per Mcf delivered to the utility. Certainly this would not be prohibitive for 1000-Btu or better natural gas. But gas delivered at that price implies maintenance of a high load factor on the pipe lines, and the high load factor is in turn contingent on an adequate interruptible load to keep the lines working during off-peak periods in domestic and commercial demand. Many industries want natural gas, but not all of them are able to take it on an interruptible basis. It is in the interest of sound public relations for the manufactured gas companies in any area to appraise their potential industrial consumers of the delivery conditions that they will have to accept. For until a potential industrial user is fully aware of the implications of temporary shut-offs his requirements cannot be considered as part of the actual effective demand for gas fuel.

When, Not If

Under a system of regulated operation such as governs all utility returns, the question of abandoning even obsolete equipment is one that has to be considered in a fiscal as well as physical frame of reference. The distributing manufactured gas utility, contemplating a partial or complete changeover to natural gas, must determine how much manufacturing equipment it can afford to abandon when taking on natural gas. To abandon too much of a property might bring the company's rate base down to a place where earnings permitted under local rate regulation would be less, despite the substitution of a cheaper and better fuel.

From the political and social standpoint, Taylor pointed out, there also remains the question as yet unanswered of whether the Federal Power Commission will permit the transportation of natural gas through areas not now fully satisfied to reach new and more remote markets.

Despite the obstacles, however, it is significant to note that the speaker recommended that all utilities in the New England area should begin to study the question, "How will I utilize natural gas *when* it comes," and not *if* it comes.

Interim Research

THE gas supply situation in the manufactured gas states has grown increasingly critical since the war. Various peak-shaving devices are being used, some with success and others as patently makeshift. We believe that New Englanders are well advised in their present course, which is to continue and accelerate their research into new and improved processes for the manufacture of cheaper and better gas, and for the use in various ways of propane as a low plant investment adjunct to coal and water gas operations.

If it is sound planning to be even now considering the question of what to do *when* natural gas comes, it is just as sound, and considerably more in the immediate public interest for New England, to continue its unremitting search for answers to the question already at hand, of what to do *until* natural gas comes.

Good Example

THE action of the New England Gas Association in electing to its board of directors a liquefied petroleum gas distributor—Peter A. Anderson of Utilities Distributors Inc., Portland, Maine—marks another step in the direction of interindustry cooperation between gas utilities and LP-gas. The first was taken two years ago when the NEGA

established a class of membership to which butane and propane operators were eligible. To date 10 of the leaders in this industry in the New England area have joined.

It is to the credit of the New England utility operators that they were in the forefront of this movement to recognize liquefied gas as an ally and potential cooperator, rather than a brazen interloper or a competitor of dubious competitive scruples.

We can readily see how the example set to the national gas industry may speedily bring about a much needed, better understanding of the identical nature of many of these industries' problems. It is the public viewpoint that matters, after all, and in the public mind there is little difference between the service rendered by one kind of gas as against that to be had out of another. There is a cordial realism in the NEGA acceptance of that fact. It will bear fruit in a better understanding, of each group by the other, that will inevitably be to the benefit of all.

Tardy Remorse

THE way things look right now, the Federal Power Commission seems to have thrown off, temporarily at least, the fever-pitch ambition that was driving it to reach out for more and more authority over the natural gas industry.

Almost coincidental with the introduction into Congress of two measures designed to limit and define the commission's authority under the Natural Gas act—the Rizley bill in the House and the Moore-Ferguson bill in the Senate—the commission in a press release accompanying the distribution of four sections of its staff report on the Natural Gas (Docket G-580) investigation, categorically disclaimed jurisdiction over natural gas production and gathering, *per se*, as being "exempt from the jurisdiction of the Federal Power Commission under the Natural Gas Act."

This isn't the first time since the investigation that the FPC has made a gesture toward bringing its administrative concepts into a little closer harmony with the interpretations of many who thought they could read the language of the law as well as the commissioners, and who didn't agree at all with the latter's breezy assumption that it was a carte blanch invitation for them to get away with anything that could be rationalized by specious legalistic reasoning.

The Credit Side

The relaxation of certificate procedures announced in January and the general attempt to speed up uncontested certificate cases must be chalked up to the credit of the commission, however; and, regardless of the motives that may have prompted the change in official attitude, they are measures destined to benefit and assist the natural gas industry. No doubt the present bland and pious repudiation of its former implied jurisdiction over sales in connection with production and gathering activities is meant to comfort and reassure both the oil and gas industries, which for the past several years have been worn raw with apprehension over what the FPC might try next.

The staff report, commenting on Sec. 1(b) of the Natural Gas Act, states:

> In view of the widespread uncertainty which has been manifest regarding the commission's view of its jurisdiction over production and gathering sales, it is important that the commission take appropriate action to relieve the doubts and fear prevailing in this regard.

From there the report goes on to say that these doubts and fears could be cleared up either by the adoption of a rule by the commission or by Congressional amendment to the Act. It then suggests that, since the meaning of the act is already clear, all could be set straight by the formal adoption of an administrative rule by the commission. In short, a promise that no matter what it has done in the past, it won't do it any more.

We have no reason to doubt that if such a rule were adopted the present commission would be inclined to abide by the strict letter of the formal rule that it might itself evolve. But on the other hand, the FPC staff has in the past proven too adept by far at manipulating the meaning of a simple statement to suit the ends of commission ambitions for any statement now to constitute a lasting assurance of its intentions to conform to the spirit of the gas law.

The commission, in its own report, admits that the language of the present law is capable of varying interpretations. If not, there would be no reason or justification for the "widespread uncertainty . . . regarding jurisdiction." There should be no objection, then, on the part of anyone to having the act amended so that uncertainty could never again exist, regardless of the political opinions or economic theories of the present or future members of the FPC.

Why Object?

REP. Rizley seems to sum up the whole argument in his statement before the House: "If the present members of the commission are agreed, as the report would seem to indicate, that the FPC under the clear intent of the Natural Gas Act is not authorized to take jurisdiction over production and gathering, then there should be no objection whatever to having the Act amended so that it will be plain and unequivocal."

It seems to us that the whole import of the findings in the Natural Gas Investigation support the contention of necessity for the amendments to the Natural Gas Act embraced in the Rizley bill. In brief, the bill would prevent any direct or indirect control by FPC over end uses of natural gas; over direct industrial sales; over production and gathering activities; and over the activities of distributing gas utilities. It would eliminate the compulsory original cost depreciation method and substitute as an option the field price method in determining operating costs. It would compel the FPC to allocate costs properly between jurisdictional and non-jurisdictional classes of properties, revenues and expenses in determining rate bases. And finally, it would compel the FPC to expedite action on certificate applications.

In a broad sense, none of these measures can properly be classed as amendments to the Natural Gas Act. They are, in reality, no more than clarifying phrases and provisions, to be incorporated into the act to prevent this commission, or any future commission, from itself amending it, by administrative interpretation, in direct contravention of the will of Congress.

Highlights

● Contracts for the construction of Michigan-Wisconsin Pipe Line Co.'s 1800-mile line from Northern Texas to Detroit, Milwaukee and other industrial centers in Michigan, Wisconsin, Iowa and Missouri have been awarded to Ford, Bacon & Davis Co., engineers. The initial construction cost will be approximately $52 million with the final total investment to come to $85 million. The ultimate capacity of the line will be 325 MMcf of gas per day.

● Application for the first general rate increase in 25 years has been made to the New York Public Service Commission by the Brooklyn Union Gas Co. The new rates which, if granted, will bring in an estimated $1.9 million in additional revenue, have been necessitated, according to Clifford E. Paige, president, by the increased costs of coal and oil and by a new wage contract recently signed with the company's local CIO union. The wage contract, retroactive to Jan. 1, provides for 15% wage increase and will add about $1.7 million annually to the company's payroll.

● The House Interstate and Foreign Commerce Committee is scheduled to open hearings April 14 on the bill, recently introduced by Rep. Rizley of Oklahoma, proposing amendments to the Natural Gas Act, and designed to define specifically and delimit the authority of the Federal Power Commission under the Act. Similar bills have been introduced in the Senate by Sens. Moore of Oklahoma and Ferguson of Michigan.

● Sixteen representatives of state utility commissions met recently in Washington at the invitation of the Federal Power Commission to outline the situation with regard to natural gas supplies and demands within their respective states and to make suggestions for coping with any shortages that may develop during the heating season of 1947-48. The FPC believes that the delivered capacity of pipe line systems will fall far short of the demand for the winter season of 1947-48.

● R. H. Hargrove, vice president and general manager of United Gas Pipe Line Co., and currently president of the American Gas Association, will take a leave of absence from United to assist in the organization and initial operational developments of Texas Eastern Transmission Corp. Texas Eastern's successful bid for the Big Inch pipe line systems has been certified by the Attorney General. Upon termination, April 30, of the present Tennessee Gas and Transmission Co. lease, under which the lines are operating, Texas Eastern will take over.

● Phillips Petroleum Co. has appealed to the Oklahoma State Supreme Court to nullify the state's corporation commission order fixing the price of natural gas in the Guymon-Hugoton field at 7 cents per Mcf. Phillips recently was denied by the commission an application seeking exception to the order. Cities Service Gas Co. already has filed its appeal with the court. Cities Service Gas was the defendant in the original case, filed by Peerless Oil & Gas Co., which resulted in the price order.

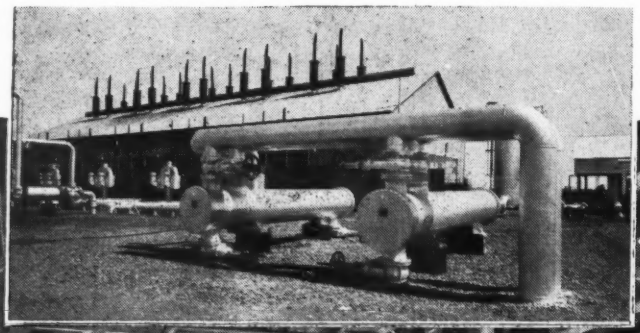
● The $11,250,000 sale of St. Louis County Gas Co. by the North American Co. to Laclede Gas Light Co., also of St. Louis, has been approved by the Securities and Exchange Commission, ending two years of proceedings, started April 7, 1945, when the SEC ruled that North American could not retain County Gas, an integrated utilities system, together with the single integrated system of Union Electric of Missouri.

● Attorney General of Louisiana Fred LeBlanc has upheld that state's conservation commission's authority to limit exports of natural gas. The opinion maintains the commission has the right to: 1. Officially define as waste "the severance and production of natural gas . . for shipment and transmission through pipe lines to new markets not now served with Louisiana gas, in new areas, adequately supplied with other fuels, or the expansion of markets as they existed on June 1, 1946, in areas adequately supplied with other fuels." 2. Require producers of natural gas when they apply for periodic allowables to disclose the destination planned for the gas. 3. Take the destination of the gas into account in setting the allowable.

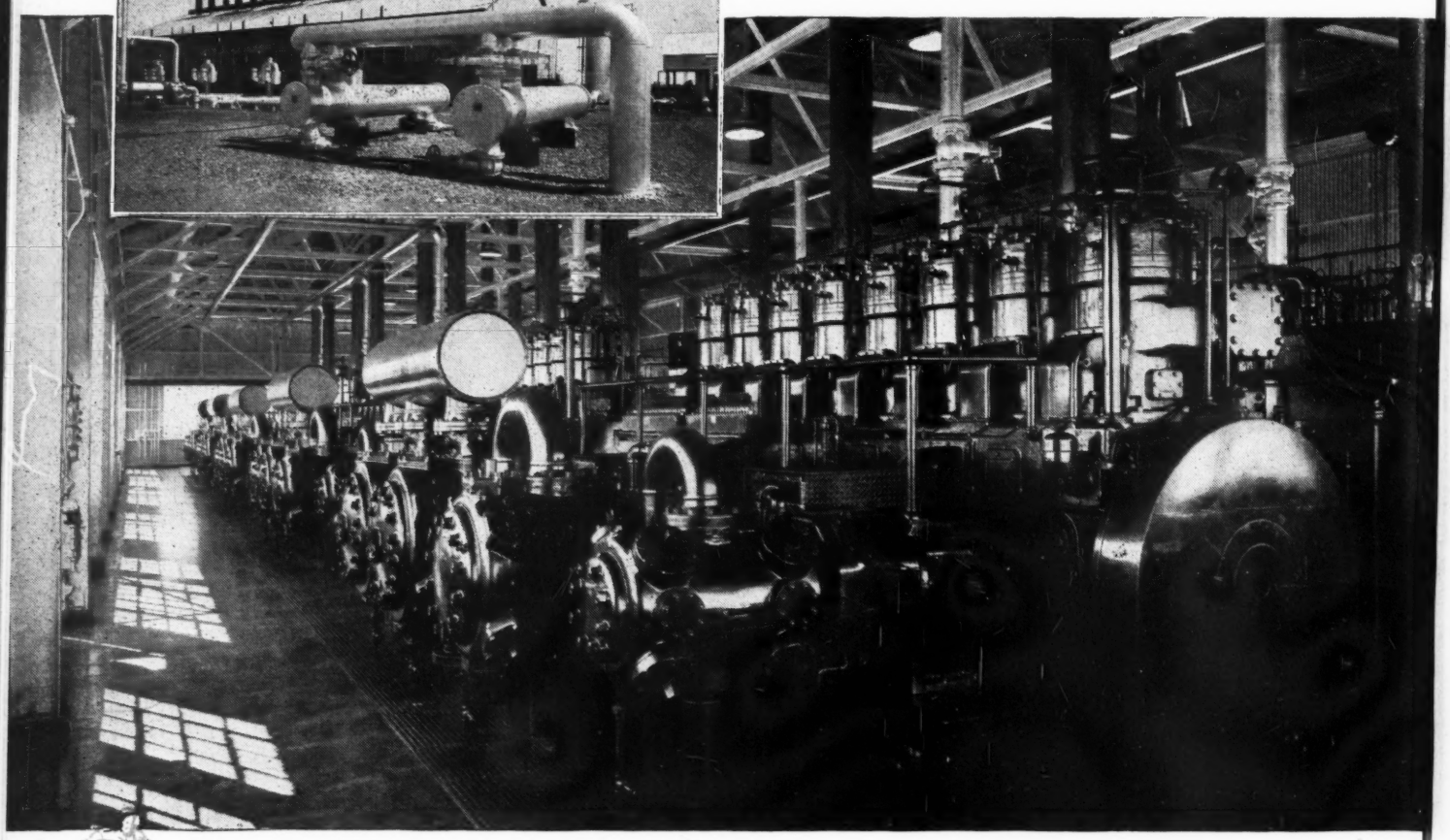
● Authority of the Oklahoma Corporation Commission to enforce ratable taking of gas within a common source of supply, even though it means closing down some wells, was upheld by the Oklahoma Supreme Court in unanimous decision handed down recently. Decision was in appeal of the Republic Natural Gas Co. from commission order of Jan. 10, 1945, in action originally brought by Peerless Oil & Gas Co. to force Republic to connect to its well in the Guymon-Hugoton field.

● The Allegheny Ludlum Steel Corp. is making a complete survey of its gas-fueled equipment with a view to converting all possible facilities from gas to oil, thereby avoiding future shutdowns caused by gas shortages during cold weather, according to H. G. Batcheller, president. Slab re-heating furnaces at the West Leechburg, Pa., plant are already in process of conversion.

JUST WEST OF BEAUMONT, TEXAS..



The McCarthy Oil & Gas Corp. gasoline absorption plant at Winnie, Texas, uses ten 8-cylinder (800 BHP) Clark RA Compressors. After natural gasoline is extracted, residue gas is furnished to nearby companies.



Just 25 miles southwest of Beaumont, Texas, is the gasoline absorption plant of the McCarthy Oil and Gas Corporation. Here natural gas is gathered from the field, compressed and then put through an absorption plant where the natural gasoline is extracted. In this plant, ten 8-cylinder (800 BHP) Clark Right Angle Gas-Engine-Driven Compressors are equipped with the proper compressor cylinders to give three stages of compression.

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YOU'RE ON THE AIR

Washington Gas Light Co. has a radio show that has built up an impressive following during its two years of existence. Mr. Martin tells what makes it successful.

By HARWOOD MARTIN
Harwood Martin Adv. Agency
Washington, D. C.

EVERY business organization sooner or later faces the question, "Should we buy radio?" And before that question is answered, a great many factors must be weighed. From the business man's point of view, radio time is essentially a vehicle to carry his advertising message. And there's no use in purchasing a vehicle going in any direction but right down the road of the firm's policy.

The prime objective, therefore, in a radio campaign should be to fit the program to your own message. It's a great temptation just to want to "get into show business," and if you've ever been behind the scenes when a live talent radio program was being conceived and produced, you know what an immense fascination the field has. You know, too, how complicated the mere technique of fitting various elements together can be. So perhaps the first step in starting right with radio is to get professional advice.

Here is where the advertising agency man comes in. He holds the key to the whole situation. First, because he's working for you and keeping your interest at the front of the picture. He thinks in terms of building a program especially suited to do the specific job you have to accomplish. You can readily see the advantage of this approach to the old-time one of buying a program a station wished to sell and then trying to adapt it to your needs. Second, an agency man keeps the overall advertising picture in mind—not radio alone, but other media as well. We always advise our clients to coordinate radio with newspaper, direct mail, car cards or other forms, when they have the budget to do so. Each reinforces the message of the other. For, as we all know, radio appeals to the ears of the world as print does to its eyes.

Buying Opportunity

Starting with the premise that when you buy radio time, you buy only an opportunity, let's consider what you can do with that opportunity. Remember first that radio commands an exceptional obligation value. You must be sure that the listener who hears what you offer him over the air-waves carries away with him a friendly, favorable feeling toward you. This "institutional" or "public relations" feature of a radio program is one of its most valuable aspects, especially for a public utility. But the general friendly feeling that a good program creates for you in your own community is by no means the end of your return from radio. Radio properly handled will sell, directly, anything from shoelaces to station wagons, and you have undoubtedly seen figures to prove the point. Let me tell you a little about how it can be done.

You start with the message you want to put across. Then you set out to find the biggest listening audience you can command, taking into consideration the tastes of the people you wish to reach. Though ratings vary in different sections of the country, and even from month to month, in any given area, the long-time preference of radio listeners is for variety shows, with music and drama also popular. With these facts in mind, let me tell you how we built a successful radio program for the Washington Gas Light Co.

"The Wonder Flame," radio show sponsored by the Washington Gas Light Co., celebrated its second birthday last month—and is still going strong. Aired every Tuesday for 30 minutes, starting at 7:30 EST, it points the way to other utilities who might be considering the use of radio for the first time.

So heartening has been the reception of the program by District of Columbia listeners that, on Feb. 7, 1946, feature star Evalyn Tyner was given two extra shows. Labelled "Tyner Time," they consisted of 15-min. piano stylings every Thursday and Saturday; that they have grown in popularity is reflected in the latest Hooper rating, which gives the program a 9.1 — considered very substantial in the radio business.

Mr. Martin, whose agency handles the Wonder Flame account, here gives a review of the program and its organization, and presents tips for other utilities to follow in considering a radio advertising budget.

WASHINGTON, D. C., is a big city today, and one with a rather unusual population. Its thousands of government workers offer an excellent cross-section of the population of the whole country. So in planning a program that appeals to Washington, we had to find one that would be acceptable in Florida and in Maine, on a Minnesota farm, or in the big-city atmosphere of San Francisco. Universal American appeal was the first requirement.

Next, we had to figure what audience we wanted to reach. The man of the home? Yes, because he pays the bills and is vitally interested in such gas service as the gas furnace or gas year-round air conditioning. The woman of the house? Yes, because she is the one whose preference for gas cooking and gas refrigeration as well as for doing her laundry with the hot water from a gas heater counts the most. Children? As much as possible, because as the young listener is inclined, so the future consumer buys. These considerations ruled out any type of "specialty" show—such as a woman's household program, a man's sportscast, or a children's serial. It also led us to plan an evening broadcast — when the whole family is at home together. For this is the time for decision—when Mother can say to Dad, "Let's go see those new gas refrigerators."

Then came the designing of the program itself. In keeping with the policy and traditions of the Washington Gas Light Co.—which in large measure must be those of any public utility—we concentrated our efforts on music. Music for everyone means everything from the lighter arias of grand opera to the more melodic popular tunes of the day. To furnish that type of music, you base your program on an orchestra and vocalists. Washington, unique because the Capital City is headquarters for people in so many walks of life, was able to provide us with the talent we wanted — talent you'd be hard pressed to find in many other communities of the same size.

For basic elements, we auditioned all available talent, and chose two singers — both experienced and well-trained in a wide range of vocal accomplishment. They are lyric soprano Bernice Rickman and baritone Robert Nicholson. Our orchestra is under the direction of Sidney of Washington, a versatile conductor of many years' experience.

Around these basic elements, we have continually made changes. A radio program should keep its character and its general effect throughout the years in order to retain its audience identity, but should have different "trimmings" and fresh points of interest from time to time in order to keep a progressive attitude.

GUEST speakers provided part of our extra interest. During the war, the Washington Gas Light Co. lent the facilities of its broadcast to many community causes, generously opening its time to appeals for the sale of War Bonds, the support of the Red Cross, and the Community War Fund. Such oustanding speakers as Admiral Marc Mitscher, Admiral Ross McIntyre, Surgeon-General Norman T. Kirk, and the discoverer of penicillin, Sir Alexander Fleming, made appearances.

Guest performers were another added attraction. The "Winged Victory" choir sang on the show, and other outstanding musicians, both vocal and instrumental, displayed their talents. One of our guest artists made such a hit with the audience that she became a third star making regular appearances: the piano stylist Evalyn Tyner.

Miss Tyner joined the regulars on the program during the transition from a wartime to a peacetime approach. During the war, when the commercial message was entirely institutional in character, the program featured a brief dramatic narration which, though separated from the actual commercial, nevertheless lent added weight to its message through stories of speed, pioneering, dependability, and other characteristics that could be applied to the services of gas and the gas company.

With the end of the war, commercials turned to the more direct selling type, designed to create a demand for the gas range, gas refrigerator, and other appliances. Length of the commercial was cut to provide a short, direct selling message with a maximum of forceful advertising in the fewest possible words.

But though the commercials are very short, the whole program carries the sponsor's message of good will. Sponsor identification begins with the title itself — "The Wonder Flame" — and throughout the half hour, brief phrases illustrate over and over the fact that this entertainment is with the gas company's best wishes. For example, we make use of the phrase, "Now you're cookin' with gas," as the highest compliment an artist can be paid. "Sings for the 'Wonder Flame'," . . . "Your gas company thinks you'd be interested to know that this selection . . . ," "The Wonder Flame Orchestra will play . . . ," "Your gas company invites you to remember the year that . . ." All these phrases worked into the brief continuity between musical offerings tie the program together and label it unmistakably as a service of the Washington Gas Light Co. and its affiliated companies in nearby Maryland and Virginia.

FROM what has been said about "The Wonder Flame" several points about all radio will be apparent to you. Flexibility is one. With a basic time and a basic approach to the show, new and interesting elements can be worked in constantly. Timeliness is another. When outstanding personalities are in the city, they can be fitted into a special-occasion program with the greatest ease. If any event of major national importance breaks, a radio broadcast can be adapted to it in the shortest possible time. "The Wonder Flame" was ready when V-E day came, and went on the air with a special half-hour show on the day itself.

Here's a point that will have occurred to you if you're thinking by now in terms of "What could I do with local radio if I bought it?" Suppose your city is one of the smaller ones, where talent is scarce. Suppose your number of meters is not such as to support a live talent show even if you could find the necessary artists. Radio's answer to that is twofold—by transcriptions or local cut-ins. There are dozens of good programs on the air today which require no more of the local station than a turntable and an announcer. A "big-time" program is

"VARIETY" SAYS

WONDER FLAME

With Sidney's Orch., Robert Nicholson, Bernice Rickman, Evalyn Tyner; Harold Stepler, announcer.
Producer: Harwood Martin
30 Mins., Tues., 7:30 p.m.
WASHINGTON GAS LIGHT
WMAL—ABC, Washington

This recently revamped musical show shares the local ether with WRC-NBC's high budget, "Washington Prelude." Unlike the latter, however, "Wonder Flame" is straight musical. It has enough class and appeal to rate its share of listeners.

Format is standard for shows of this type: 12-piece orchestra opens with overture, then baritone Robert Nicholson, soprano Bernice Rickman, and pianist Evalyn Tyner alternate in doing their stuff. Program moves at a good clip and sustains interest, with emphasis on "pop" music.

Standout on show is piano stylist Tyner. Gal, a local product, who has played N. Y. club dates, and is booked into the Roxy there for the near future, rates with Hazel Scott. She gives novelty and style to any number, varying from sentimental to jive. Is currently fed out of D. C. on ABC net in a piano stint on Fridays, at 12:30.

Program is pleasant throughout, with Harold Stepler's commercials and emceeing in good taste and easy to take. —*Lowe*

put on records, with spaces in it for your message to be delivered by the local announcer. Or the same effect can be provided, under certain circumstances, by a network show with a local cut-in. At the cue, the local announcer fades down the background music fed to him by the net, reads your commercial and fades the show back in. We handle both types of programs for some of our clients here in Washington and find them very satisfactory if used with care. The costs of both types are pro-rated on the basis of population of the area you serve. The same transcribed show might cost a New York station $1000 and Great Crossing, Iowa, only $37.50. Both these prices might be eminently fair on the basis of listener per dollar which, in the last analysis, is the only accurate way to judge the value of radio to you.

Acceptance Takes Time

And here's another thing about radio you should know before you attempt to begin an air campaign. The longer you have radio, the more it does for you. From your own listening habits you know that it takes a considerable length of time—often months—to get "in the habit" of hearing any given show. If your objective is only a quick sale of a given item—such as drawing attendance to a gas company cooking school—don't bother with a radio program. Buy spots on the air, and buy space in the papers.

But when you want to establish a long-range consumer acceptance of your company, your service, and your appliances, then expect to spend 13 weeks—at least—in just slowly building up an audience. The second 13 weeks will please you much better, if they follow the trend of our experience and that of all the others we've talked to through the years. Your second year will be better than your first and, if you've got the right radio program, your third, fourth and fifth will make you beam with pleasure.

Not that you need necessarily to stay with just one half-hour, or one program without any drastic changes. When you have made your community conscious of your radio efforts, supplement a big first-effort show with extras on the side. For example, the Washington Gas Light Co. supplements the big Tuesday night "Wonder Flame" with 15 minutes on Thursday and Saturday called "Tyner Time." The star pianist of the Tuesday show takes over the other two spots with just her accompanying drums and bass —at 6:15 p.m. on another station.

Once you have the prestige show and the policy set, hit next for frequency with the extras. It might be a cooking school of the air, run by your home economist—it might be a five-minute strip of news at a popular morning time. Your own local availabilities and community preferences will tell you what to use.

So, in brief, we've tried to give you a picture of radio—from the point of view of one who's lived with radio for eight years, night and day. If my experience and that of the Washington Gas Light Co. can help you with your public relations, I'm more than glad. And remember this: despite all the difficult and important decisions to be made before you go into radio, there are few more exciting moments in life than that split fraction of a second before the program director in the control booth clicks his stop watch and levels his finger for the cue—

"You're on the air!"

STARS of the "Wonder Flame" show: Top to bottom, Bernice Rickman, soprano; Evalyn Tyner, piano stylist; Robert Nicholson, baritone.

CONTRIVANCE	"NUISANCE"
Abutments	No
Automobiles & Trucks	No
Block and Tackle	Maybe
Blow-off Pipe	Maybe
Bosun Chair	No
Bridge	No
Buildings Under Construction	No
Canal	No
Cave-in Possibility	Yes
Chemicals	Maybe
Cofferdam	No
Cogwheels	Yes
Conduit	Maybe
Dam	No
Derrick	No
Drainage Ditch	No
Door	No
Electric Poles, Towers	Yes
Electric Wires	Yes
Elevators	Maybe
Excavation	Maybe
Explosive Substances	Yes
Fire Escape	No
Flywheel	Yes
Gas Leak	Yes
Gas Pipes	Maybe
Gas Well	No
Guy Wires (Loose)	Maybe
Hoisting Apparatus	Maybe
Hot Tar	Yes
Hot Water	Maybe
Ladder	No
Lime (Caustic)	Yes
Lumber Pile	Maybe
Machines	Maybe
Manhole	Maybe
Man Lift	Maybe
Molten Lead	Yes
Oil	Maybe
Scaffold	No
Platform	No
Pond or Reservoir	No
Power House	Maybe
Pulleys	Maybe
Pump House	Maybe
Retaining Wall	No
Revolving Shaft	Yes
Roof	No
Rope	No
Rubbish Dump	Maybe
Sand Pile	No
Shelves	No
Shed	No
Sidewalk Covering	No
Skid	Maybe
Stairway	No
Storage Tanks	No
Tractor	No
Trees	No
Trench or Pit	Maybe
Tunnel	Yes
Ventilating Fan	Yes
Wall	No
Wheelbarrow	No
Winch	Yes

A Utility's Liability for

An "Attractive Nuisance

By MILFORD SPRINGER

Assistant Counsel, Southern California Gas Co., Los Angeles

A TRESPASSER comes on one's property without privilege or consent, so it is the general rule that one must merely refrain from causing intentional or wanton injury to him, and there is no duty to keep the property in safe condition or to carry on activities carefully.[1] However the "attractive nuisance" doctrine, which involves children, is a qualification of the general rule that the property owner owes no affirmative duty of care to a trespasser. In 1891, California adopted the humanitarian view, and held that a railroad turntable, although fastened in the customary manner, is an "attractive nuisance" and that the owner must pay damages for injuries sustained by a child while playing on it even though it was set in motion by the negligent act of other boys.[2]

The doctrine involves the balancing of opposing conveniences; and children are considered social assets, so a duty of care is imposed on the property owner without placing an unreasonable burden upon him or his right to make a beneficial use of the property. Furthermore, the doctrine is consistent with the old common-law duty to refrain from wilful injury to a trespasser, which made the property owner liable for the maintenance of a concealed danger or trap into which he might reasonably anticipate that others might fall.

Duty of a Utility

A child of tender years is expected to exercise only such care and self-restraint as belongs to childhood or, specifically, to minors of like age, mental capacity and discretion. A reasonable man must be presumed to know this, so he is required to act accordingly, and, to the lack of judgment on the part of children, the care observed toward them by him must be increased proportionately.[3]

One who places an attractive but dangerous contrivance in a place frequented by children, and has reason to believe that children will be attracted to it and consequently subjected to injury, owes the duty of exercising ordinary care to prevent injury to them, because he is charged with knowledge that children are likely to be attracted to the contrivance and are usually unable to comprehend and avoid the danger into which he thus lures them.[4]

Actual notice that children are in the vicinity of the dangerous contrivance is not essential in determining that the property owner is liable.[5]

A California court has said that "it is as much a want of ordinary care for a person to fail to use his mind and anticipate an obvious danger to another, as it is for him to fail to use his sight and see an apparent danger to another."[6]

Some limitations, however, have been placed on the doctrine, and the contrivance must be artificial and uncommon, as well as attractive and dangerous.[7] Also, it must be easily safeguarded without impairing its usefulness for the purpose for which it was designed.[8] In addition, the contrivance has to be readily accessible.[9]

A property owner must exercise the care of an ordinarily reasonable or prudent person, but is not an insurer against injuries to children, and is not required to guarantee the safety of such trespassers.[10]

A minor is bound to exercise his intelligence, and if he comprehends the peril he must use such care to avoid injury as fairly may be expected from children of his age and physical and mental capacity. For example, a 12

[1] *Giannini* v. *Campodonico*, 176 Cal. 548, 550.

[2] *Barrett* v. *Southern Pacific Co.*, 91 Cal. 296.

[3] *Barrett* v. *Southern Pacific Co.*, 91 Cal. 296, 302; *Hunt v. Los Angeles Railway Corp.*, 110 Cal. App. 456 460.

[4] *Cahill* v. *Stone & Co.*, 153 Cal. 571, 574; *Lambert* v. *Western Pac. R. R. Co.*, 135 Cal. 81, 85.

[5] *Katz* v. *Helbing*, 215 Cal. 449, 453.

[6] *Morse* v. *Douglas*, 107 Cal. App. 196, 203.

[7] *Peters* v. *Bowman*, 115 Cal. 345, 356; *Melendez* v. *City of Los Angeles*, 8 Cal. (2d), 741, 746; *Walker* v. *Pacific Electric Ry. Co.*, 66 Cal. App. (2d) 290, 294.

[8] *Polk* v. *Laurel Hill Cemetery Assn.*, 37 Cal. App. 624, 637.

[9] *Minter* v. *San Diego Consolidated Gas & Electric Co.*, 180 Cal. 723; *Hale* v. *Pacific Tel. & Tel. Co.*, 42 Cal. App. 55.

[10] *Beeson* v. *City of Los Angeles*, 115 Cal. App. 122, 132; *Wilson* v. *City of Long Beach*, 71 Cal. App. (2d) 235, 242.

year-old boy knew the danger of igniting powder and was denied damages for injuries from the resulting explosion, because he was guilty of contributory negligence.[11]

Examples of Attractive Nuisances

A variety of machines, appliances, materials and contrivances have been classified as attractive nuisances by the courts. Here are a few examples, which should be pertinent to gas and electric utility activities.

In a residential district, employees quit work for the day and left a two-wheeled hot tar vat on the street. A seven-year-old boy stepped on the rear platform and started to stir the boiling tar with a stick which had been left in the vat between its side and the cover. The boy's weight overbalanced the vat. Hot tar poured over him and burned him to death. The contrivance was found to be an attractive nuisance, and a judgment for damages was affirmed by the appellate court.[12]

In the construction of a pole line, dynamite caps had been used in connection with blasting the pole holes along a right of way. Two empty wooden boxes and some loose dynamite caps were scattered on the ground in plain view of children in the vicinity by the construction crew as it progressed. A 12-year-old boy from the construction camp was attracted to the boxes and caps, and was injured while examining dynamite caps for the first time. The appellate court applied the attractive nuisance doctrine.[13]

During the construction of a building, contractors obtained a city permit to place building materials on the sidewalk. A wooden box was made to hold caustic lime, which was delivered on the job already mixed. A boy, 12, threw some of the lime at a streetcar and injured a passenger, ultimately causing the removal of one eye. The injured man was given a $16,000 judgment against the contractors under the attractive nuisance rule.[14]

Negligently piled lumber, from which trespassing children have received injuries, has been classified as as "attractive nuisance."[15] The reasoning in the lumber pile cases might be applied to pipe or poles stacked in an unsafe manner if a trap or concealed danger is created.

A natural gas pipe line 10 in. underground had a leak which was accessible to children. Inspection was inadequate. One child ignited the gas, and a girl of six was burned when her clothes caught fire from paper nearby when the gas was lighted by her companion. The Louisiana court found this gas leak to be an attractive and dangerous thing, invisible and odorless, but highly inflammable, and held the company liable for the child's injuries in the amount of $5000.[16]

The nature of electricity and its existence as a concealed danger impose a relatively high degree of care on the utility handling it. Under the attractive nuisance doctrine, utilities have been held liable for damages to minors who easily reached the steps on an electric pole and climbed within reach of high-voltage wires with consequent injuries.[17] It is the duty of the utility also to make reasonable inspections to determine whether charged wires are hanging loose or whether the insulation has deteriorated with consequent hazard to others.[18]

The attraction must be such that children do not appreciate the danger; natural, common, and familiar dangers are therefore excluded from the operation of the attractive nuisance rule. For example, an unguarded pool of water or reservoir, whether natural or artificial, is excluded, because the danger of drowning in it is apparent to any child old enough to be permitted by his parents to play unattended in the vicinity.[19] Of course, if a body of water contains an artificial, concealed peril the attractive nuisance rule applies. For instance, $6000 was awarded for the death of a five-year-old boy, who fell into a shallow canal which had a large, concealed and unguarded syphon at the bottom, into which the boy slipped and was drowned.[20]

A large, open and unfenced excavation on the owner's premises 22 ft. from the street has been excluded from the rule.[21] But this situation must be distinguished from the cases in which damages are awarded for injuries caused by dangerous and negligently maintained excavations on the sidewalk or in a public street to persons who have a right to be there.[22] Also, an unguarded and hidden excavation in the nature of a trap, such as the stope in the tunnel of a mine, into which an 11-year-old boy fell and was killed, has been held to be an attractive nuisance, and the company was held liable for damages.[23]

A properly maintained fire escape, although attractive to venturesome children, has been excluded from the attractive nuisance doctrine.[24] The majority rule is that the property owner is not liable for injuries to trespassing children who jump or fall from useful, non-defective, and stationary structures reached by climbing —such as abutments, buildings under construction, fences, ladders and steps, roofs, scaffolds, storage tanks, and walls.[25]

The attractive nuisance doctrine has not been extended to cover the lawful operation of vehicles in common use on public streets, such as vans, automobiles, trucks, tractors and road-con-

[11] *Mathews* v. *City of Albany*, 36 Cal. App. (2d) 147 For contributory negligence of a twelve-year-old boy in "shinnying" up the vertical supports of a high-voltage steel tower, resulting in his electrocution, see *Wallace* v. *Great Western Power Co.*, 204 Cal. 15.

[12] *Morse* v. *Douglas*, 107 Cal. App. 196; 19 Cal. L. Rev. 86.

[13] *Lambert* v. *Western Pac. R. R. Co.*, 135 Cal. App. 31.

[14] *Katz* v. *Helbing*, 215 Cal. 449.

[15] *St. Louis & S. F. R. Co.* v. *Underwood*, 194 Fed. 363; See *Peters* v. *Bowman*, 115 Cal. 345, 350; c. f. *Pastene* v. *Adams*, 49 Cal. 87.

[16] *Jackson* v. *Texas Co.*, 143 La. 21, 78 So. 137.

[17] *Clark* v. *Pacific Gas & Electric Co.*, 118 Cal. App. 344; *Brown* v. *Southern California Edison Co.*, 120 Cal. App. 102; See 17 ALR 833.

[18] *Tackett* v. *Henderson Bros. Co.*, 12 Cal. App. 658, 661; *Pierce* v. *United Gas & Electric Co.*, 161 Cal. 176, 183; *Langazo* v. *San Joaquin L. & P. Corp.*, 32 Cal. App. (2d) 678, 682.

[19] *Peters* v. *Bowman*, 115 Cal. 345; *Polk* v. *Laurel Hill Cemetery Assn.*, 37 Cal. App. 624; *Reardon* v. *Spring Valley Water Co.*, 68 Cal. App. 13; *Beeson* v. *City of Los Angeles*, 115 Cal. App. 122; *Melendez* v. *City of Los Angeles*, 8 Cal. (2d) 741; *King* v. *Simons Brick Co.*, 52 Cal. App. (2d) 586; 26 Cal. L. Rev. 159.

[20] *Sanchez* v. *East Contra Costa Irrigation Co.*, 205 Cal. 515.

[21] *Loftus* v. *Dehail*, 133 Cal. 214; See Sec. 24400 of the Health and Safety Code on required safeguard for an abandoned excavation; cf. *Malloy* v. *Hibernia Savings & Loan Society*, 3 Cal. Unrep. 76.

[22] *Fernald* v. *Eaton & Smith*, 40 Cal. App. 498; *Hines* v. *Milosivich*, 68 Cal. App. (2d) 520.

[23] *Faylor* v. *Great Eastern Quicksilver Mining Co.*, 45 Cal. App. 194.

[24] 9 ALR 271; 145 ALR 325; See *Marsiglia* v. *Dozier*, 161 Cal. 403.

[25] 145 ALR 322; See *Camp* v. *Peel*, 33 Cal. App. (2d) 612; *Doyle* v. *Pacific Electric Ry. Co.*, 6 Cal. (2d) 550, 553.

ditioning machinery.[26]

Guide for Determining when a Utility Should Safeguard an Attractive Contrivance

California applies the humane rule, which makes it probable that, in cases wherein doubt exists in connection with injury to a trespassing child by a novel, attractive, and dangerous contrivance, the owner of the contrivance will be held liable by the courts and ordered to pay damages. It is therefore suggested that, when the answer is "yes" to each of the following questions as applied to a particular contrivance, action should be taken to safeguard it, if the utility has not already accomplished this, to the extent that a reasonably prudent person would do so. Most of the attractive nuisance cases involve children under 10 years of age, so precautionary tests might be geared with foresight to the intelligence and tendencies of that age group.

Ingredients of an "Attractive Contrivance" [27]

1. Will children be attracted to the contrivance?
2. Is there reason to anticipate the presence of children in the vicinity of the contrivance?
3. Is the contrivance accessible, uncommon, artificial, and a concealed danger to children?
4. Would a child be unable to appreciate and avoid the concealed danger, so that there is a strong likelihood of accident?
5. Is it practicable to install safeguards, or otherwise prevent the exposure to danger without impairing the usefulness of the contrivance?

The human element in these cases makes it impossible to develop an infallible classification. However, from the reported California cases, and cases in other states applying the humane rule,[28] the gas and electric utility guide shown in the table has been developed with reference to the nature of the attraction and the cause of the injury.

In the tabular guide, if the contrivance is classified under "Attractive Nuisance" as "Yes" or "Maybe," it is suggested that a reasonable and practicable safeguard be employed in connection with that contrivance to reduce the probability of the utility's paying damages for injury to children attracted by the contrivance. Of course, if the cost of the safeguard is out of proportion to the frequency of exposure, business judgment would probably dictate assumption of the risk.

Presented at a meeting of the Safety Committee of the Pacific Coast Gas Association at Santa Barbara, Calif., Jan. 16, 1947.

[26] *Allred* v. *Pioneer Truck Co.*, 179 Cal. 315; *Wilson* v. *City of Long Beach*, 71 Cal. App. (2d) 235. Loading equipment for icing a refrigerator car is not an "attractive nuisance." *Hernandez* v. *Santiago Orange Growers' Assn.*, 110 Cal. App. 229.

[27] See Restatement of the Law of Torts, Sec. 339.

[28] Many cases have been compiled on the doctrine of attractive nuisances, and for subjects not yet treated by California reported decisions, the decisions in other states, which considered a particular contrivance an "attractive nuisance," have been used in developing the guide to the probable future California decisions under the humane rule. For compilations, see 36 ALR 34; 145 ALR 322.

FPC Defines Limits of Jurisdiction; Declares Act Amendment Unnecessary

COINCIDENT with nationwide anti-FPC agitation and the introduction of a bill by Rep. Rizley of Oklahoma, proposing amendments to the Natural Gas Act and delimitation of FPC authority under the Act, the commission has issued a staff report defining its jurisdiction over the production and gathering sales of natural gas under Section 1(b) of the Act.

The report pointed out that "the significant distinction is between the functions of production and gathering, which are exempt from regulation under the Act, and the functions of interstate transportation and sale, which are made subject to its regulation." It continued with the statement that in view of widespread doubts and fears regarding commission jurisdiction, clarification could be made by formal adoption of an administrative rule or by recommendation of an amendment to Section 1(b). The report added: "However, since the conclusion herein is that the Act, both as to its intent and the language of Section 1(b), is already definite on this point, there would seem to be no fundamental need for an amendment of the Act . . . "

In conclusion, the commission declared " . . . it should be made clear and certain that all activities, including sales made at arm's length, by those who only produce, gather or process natural gas prior to its transportation or sale by others for resale in interstate commerce are exempt from the jurisdiction of the Federal Power Commission under the provisions of the Natural Gas Act."

Besides the report on Section 1(b), three other sections of the staff report —concerning state conservation laws and activities; natural gas reserves of the United States; and practices and problems in producing, gathering and processing—have been issued.

It is the commission's conviction that promoting conservation and equitable production is a state function and that " . . . there would appear to be no need at this juncture to disturb the existing situation under which the states bear the responsibility for necessary controls as to conservation . . . "

In the section on natural gas reserves, the FPC's attitude is summed up in the following statement: "So long as the trend is either upward or stable, the reserve situation is in a healthy condition. Should there be a sustained decline in this index, however . . . reappraisal of this natural resource in relation to the consumer requirements to be met, and a closer surveillance of proposed extensions of pipe line facilities (would be required)."

Avoidance of waste is declared to be the foremost problem in connection with producing, gathering and processing gas. "Important new concepts of scientific reservoir management are gradually displacing earlier practices of uncontrolled competitive production and unrestricted supply. More fully recognized, too, is the fundamental relationship between conservation of gas and the price which it brings in the field. Repeatedly at the hearings in this investigation it was stressed that the prime essential for effective conservation is a price at the well that will give producers an economic incentive to eliminate its waste."

Further, in regard to the control of casinghead gas, the report states: "No efforts should be spared to reduce to the lowest practicable minimum this still serious waste of a limited natural resource. Every opportunity should be pursued for the limitation of gas-oil ratios to the necessary requirements of oil production, for the reinjection of gas to maintain reservoir pressures, and for securing market connections for gas which would otherwise be blown to the air. It can no longer be contended, as a general principle, that flaring of casinghead gas is not wasteful because such gas has already served its essential function in helping to bring oil to the surface. That attitude belongs to an earlier and largely outmoded era in the production of associated oil and gas."

COOLING TOWER PERFORMANCE

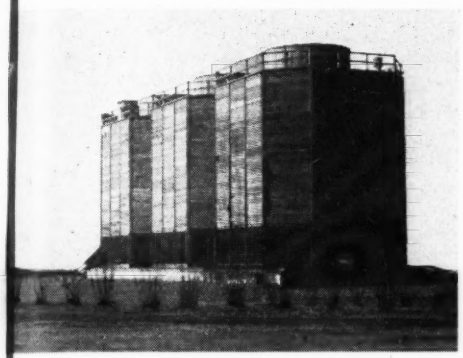
Evaluated For The Plant Operator

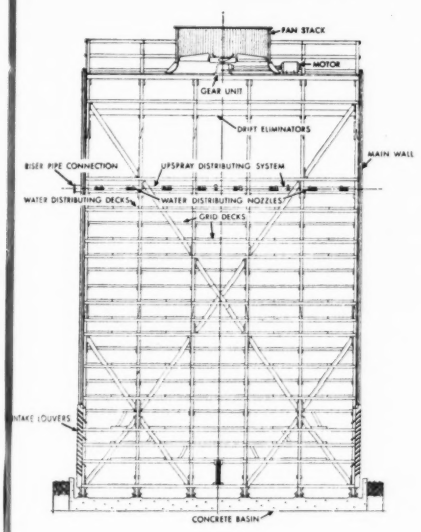
Presenting completely new data on mechanical draft towers and revised information on atmospheric towers obtained from extensive field tests and actual operating conditions.

By JAMES G. De FLON

Chief Cooling Tower Development Engineer

Fluor Corp., Ltd.





Figs. 2 and 3 (See text). Three-cell mechanical draft cooling tower built for a large eastern tire company. Cross-section view is of same type of tower. With the upspray distributing system it is necessary to allow sufficient space between the drift eliminators and nozzles for a spray chamber. All illustrations courtesy Fluor Corp.

THE processes of cooling water are among the oldest and simplest known to man. All that is required to cool water is to expose its surface to air. Some of these cooling processes are slow, such as the cooling of water on the surface of a pond; while others are comparatively fast, such as the spraying of water into air. These processes all involve the exposure of water surface to air with varying degrees of efficiency.

The heat transfer process involves a latent heat transfer, caused by change of state of a small portion of the water from liquid to vapor, and a sensible heat transfer, caused by the difference in temperature of water and air. Approximately 1000 Btu are required to evaporate 1 lb. of water, which is the amount of heat lost in cooling 100 lbs. of water 10°. Therefore, for each 10° of cooling effected, roughly 1% of water is lost by evaporation. In addition, there will be a spray loss of not more than 0.2% in a well-designed atmospheric or mechanical draft tower. Water cooling from 120° to 90°, for example, will therefore lose 3.2% of its weight (3 plus .2%) with each passage through the tower.

In cooling towers in which the water is warmer than the air, the heat removed from the water and transferred to the air (q_t) is the sum of the sensible heat and the latent heat of evaporation. The sensible heat q^s is small compared to the latent heat transferred, wr. This can be expressed by the equation:

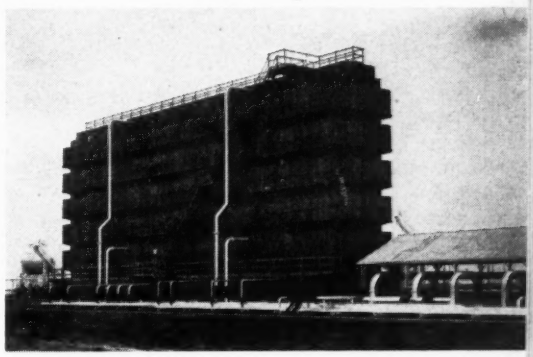
$$q_t = q^s + wr$$

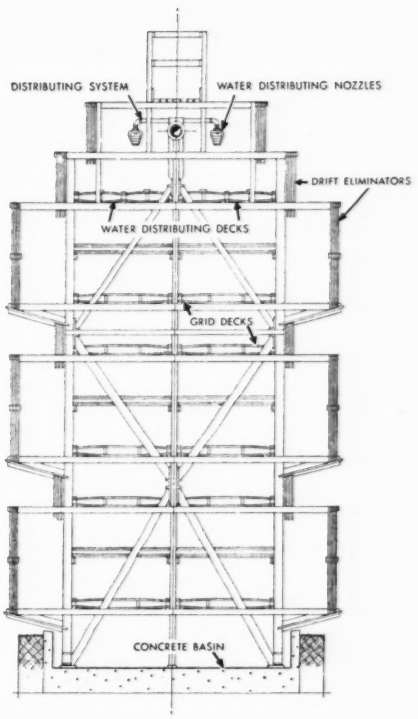
The performance of a cooling tower (w) can be expressed as:

$$w = kA\Delta p_m$$

The factors which influence the performance of a cooling tower are therefore those which affect the expression $kA\Delta p_m$. The value kA depends on the construction of the equipment, the extent of water surface exposed through drop surface and filming surface, and the velocity of the air. Δp_m depends on the temperature of the water and the temperature and humidity of the air. Actually, Δp_m represents the difference in vapor pressure between the water at its temperature and the water if it were at the wet bulb temperature of the air.

It is evident from the above that the water cannot be cooled below the wet bulb temperature of the entering air. The wet bulb temperature, or to be





Figs. 1 and 9. (See text). Atmospheric tower at large western cycling plant. Jacket water house pump at right. Below it is cross section. Function of drift eliminators on sides is to separate entrained water from discharging air stream, reducing airborne drift loss to minimum.

more precise, the adiabatic saturation temperature, represents the minimum temperature that the water would reach with infinite time of contact between water and air in a cooling tower. This must be kept in mind when designing a plant to operate on cooling tower water.

General Considerations

As process refinements have appeared, industry has demanded closer and closer control of its production units, resulting in more exacting demands being made upon cooling towers. In many plants, each additional degree of cooling has meant hundreds and even thousands of dollars per day increased production. It has, therefore, been necessary for the cooling tower industry to produce a tower which would supply the colder water more economically.

There are two types of cooling towers in general use today—the atmospheric (*See Fig. 1*) and the mechanical draft (*See Fig. 2*). The older apparatuses for cooling water, i.e., the spray pond and natural draft chimney towers, have been almost exclusively replaced by these two types of cooling towers. The objection to the spray pond is the limited performance available and the nuisance created by the high water loss occurring during certain seasons of the year. The objection to the natural draft tower is the high initial cost and the serious reduction in performance experienced during periods of hot weather. Both the atmospheric and the mechanical draft towers are capable of cooling water to the same minimum temperatures. The economic situation, the prevailing atmospheric conditions, the desired approach to the wet bulb temperature, and the amount of space available will indicate which type to select.

Mechanical Draft Towers

There are two types of mechanical draft towers in use today—the forced draft and the induced draft. In the forced draft tower, the fan is mounted at its base and the air is forced in the bottom and discharged through the top at low velocity. In the induced draft tower, the fan is mounted on the roof of the structure and air is pulled upward and discharged at a high velocity.

The forced-draft type is fast losing favor as it is more often subjected to the recirculation of the hot humid exhaust vapors back into the air intakes than the induced-draft type. This occurs under certain atmospheric conditions because the velocity of the humid exhaust air is so low that the suction created by the fans tends to draw it back into the tower. Since the wet bulb temperature of the exhaust air is considerably above that of the ambient air, there is a decrease in performance evidenced by an increase in cold water temperature.

Except for the location of the fans, the structural and operational features of the two types of mechanical draft towers are essentially the same. A cross-sectional view of the induced-draft tower with the various parts labeled is shown in *Fig. 3*. The entrained moisture is removed from the exhaust air by the drift eliminator, which is placed just above the spray chamber and below the fan. The water is pumped to the main header located in the top of the tower where it is distributed to the various nozzles. This water is sprayed up in a manner similar to that used in a spray pond, and is intimately mixed with the exhaust air before dropping to the decks below. (In performance, the upspray distributing system represents the equivalent of adding 8 or 9 ft. to the height of the cooling tower above that of the gravity-type system.) The fall of the water is interrupted by the slat-type grids as it flows countercurrently to the air. In flowing countercurrently, the coldest water contacts the driest air and the warmest water contacts the most humid air. Maximum performance is thus obtained since the temperature of all of the cold water is approaching the wet bulb temperature of the entering dry air. This was not true of the older cross-flow and parallel-flow type cooling towers.

The performance of a given type cooling tower is governed by the ratio of the weights of air to water and the time of contact between water and air. In commercial practice, the variation in the ratio of air to water is first obtained by keeping the air velocity constant at about 350 ft. per minute per sq. ft. of active tower area and varying the water concentration (gals. per minute per sq. ft. of tower area). As a secondary operation, the air velocity is varied to make the tower accommodate the cooling requirement. The time of contact between water and air is governed largely by the time required for the water to discharge from the nozzles and fall through the tower to the basin. The time of contact is, therefore, obtained in a given type of unit by varying the height of the tower. Should the time of contact be insufficient, no amount of increase in the ratio of air to water will produce the desired cooling. It is therefore neces-

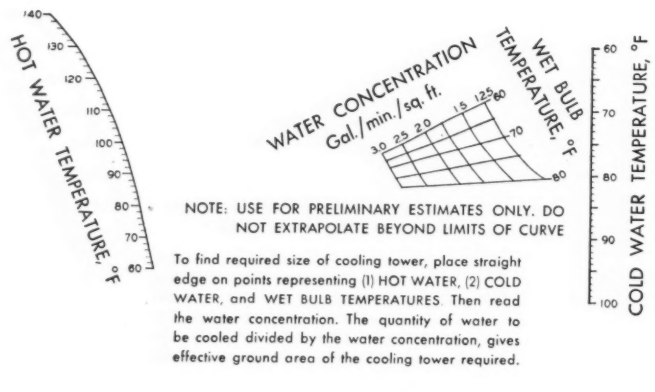


Fig. 4. Performance curve of a mechanical draft cooling tower with upspray distributing system containing 24 ft. of filling.

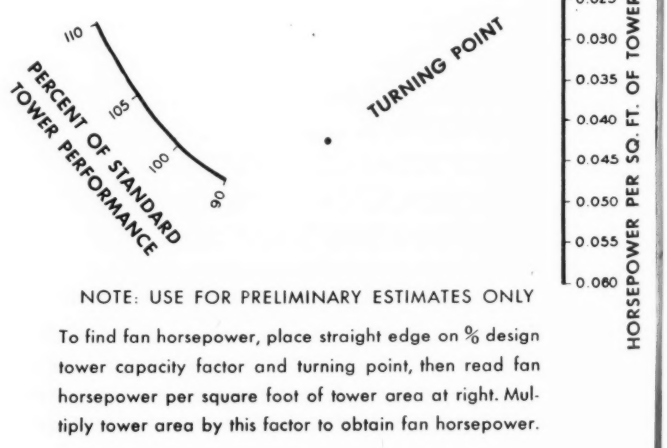

PERCENT OF STANDARD TOWER PERFORMANCE
110
105
100
90
TURNING POINT
HORSEPOWER PER SQ. FT. OF TOWER AREA
0.025
0.030
0.035
0.040
0.045
0.050
0.055
0.060
NOTE: USE FOR PRELIMINARY ESTIMATES ONLY
To find fan horsepower, place straight edge on % design tower capacity factor and turning point, then read fan horsepower per square foot of tower area at right. Multiply tower area by this factor to obtain fan horsepower.

Fig. 5. Fan horsepower curve for mechanical draft cooling towers with 24 ft. of filling.

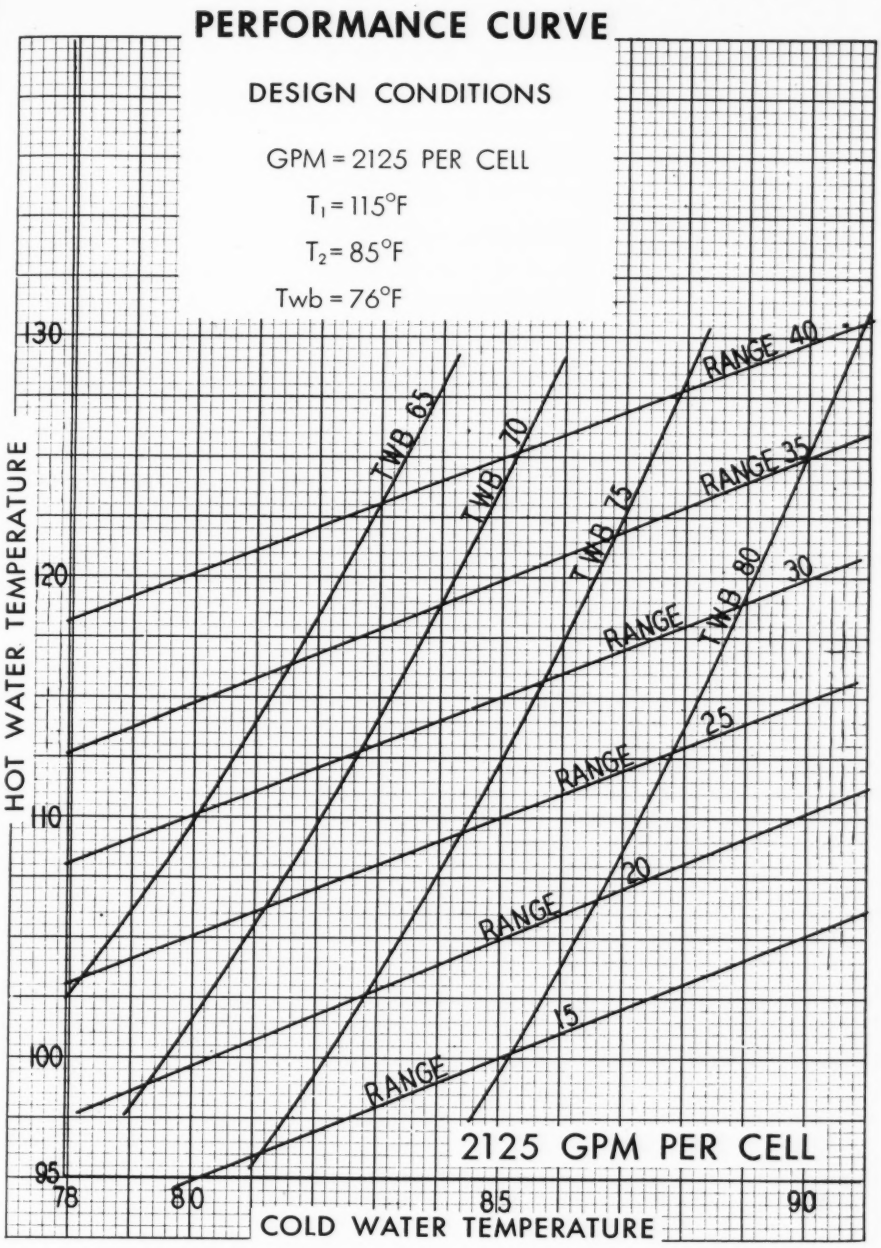


Fig. 6. Typical performance curve for a mechanical cooling tower.

sary that a certain minimum height of cooling tower be maintained. Where a wide approach[1] of 15° to 20° to the wet bulb temperature and a 25° to 35° cooling range[2] is required, a relatively low cooling tower will suffice. A tower in which the water travels 15 to 20 ft. from the distributing system to the basin is sufficient. Where a moderate approach of 8° to 15° and a cooling range of 25° to 35° is required. a tower in which the water travels 25 to 30 ft. is adequate. Where a close approach of 4° to 8°, with a 25° to 35° cooling range is required, a tower in which the water travels 35 to 40 ft. is required. It is usually not economical to design a cooling tower with an approach of less than 4°, but it can be satisfactorily accomplished with a tower in which the water travels 35 to 40 ft.

Fig. 4 shows the relationship of the hot water, cold water and wet bulb temperatures to the water concentration. From this, the minimum area required for a given performance of a well-designed counterflow-induced draft cooling tower can be obtained. *Fig. 5* gives the hp per sq. ft. of tower area required for a given performance. These curves do not apply to parallel or cross-flow cooling since these processes are not as efficient as the counterflow process. Also they do not apply where the approach to the cold water temperature is less than 5°. These charts should be considered approximate and for preliminary estimates only. Many factors not shown in the graphs must be included in the computation and hence the manufacturer should be contacted for final design recommendations.

The cooling performance of any tower containing a given depth of filling varies with the water concentration. It has been found that the maximum contact and performance is obtained with a tower having a water concentration of 2 to 3 gal. of water per minute per sq. ft. of ground area. Thus, the problem of calculating the size of a cooling tower becomes one of determining the proper concentration of water required to obtain the desired results. A higher tower will be required if the water concentration falls below 1.6 gal. per sq. ft. Should the water concentration exceed 3 gal. per sq. ft., a lower cooling tower may be used. Once the necessary water concentration is obtained. the tower area can be calculated by dividing the gal. per minute circulated by the water concentration gal. per sq. ft. The required tower size then is a function of the following:

1. Cooling range (Hot water temperature minus cold water temperature.)
2. Approach to wet bulb temperature (Cold water temperature minus wet bulb temperature.)
3. Quantity of water to be cooled.
4. Wet bulb temperature.
5. Air velocity through the cell.
6. Tower height.

To illustrate the use of the charts let us assume that we have the following cooling conditions:

Hot water temperature	= 102°
Cold water temperature	= 78°
Wet bulb temperature (Twb)	= 70°
GPM	=2000°

Laying a straight edge across *Fig. 4* and connecting the points representing the design water and wet bulb temperatures, we find that a water concentration of 2 gal. per sq. ft. is required. Dividing the quantity of water circulated by the water concentration, we find that the theoretical area of the tower is 1000 sq. ft.

To obtain the theoretical fan horsepower, we use *Fig. 5*. Connecting the points representing the 100% of standard tower performance with the turning point, we find that it will require .041 hp per sq. ft. of actual effective tower area. Multiplying by

[1]The approach is the difference between the cold water temperature and the wet bulb temperature.

[2]The cooling range is the difference between the hot water tmeperature and the cold water temperature.

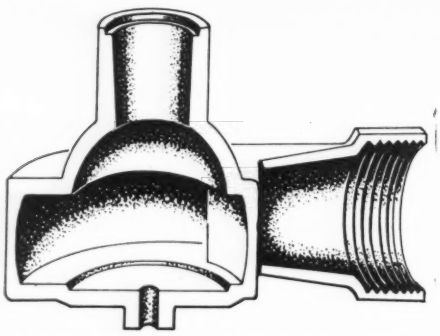


Fig. 7. Cutaway view of an upspray nozzle shows the side entrance which starts the spiral action upward to the discharge orifice. The removable screw plate can be drilled as shown for automatic draining to prevent winter freezing.

the tower area of 1000 sq. ft., we find that it requires 41.0 fan horsepower to perform the necessary cooling.

Suppose that the commercial tower size is such that the actual tower area is 910 sq. ft. We can still obtain the cooling equivalent to 1000 sq. ft. of standard tower area by increasing the air velocity through the tower. Within reasonable limits, the shortage of actual area can be compensated for by an increase in air velocity through the tower which, in turn, requires a higher fan horsepower. Our problem then becomes one of increasing the performance of the smaller tower by 10%. From *Fig. 5*, by connecting the points representing 110% of standard tower performance and the turning point. the fan horsepower is found to be .057 hp per sq. ft. of actual tower area, or .057 x 910 = 51.9 hp.

On the other hand, suppose the commercial tower size is such that the actual tower is 1110 sq. ft., the cooling equivalent to 1000 sq. ft. of standard tower area can be accomplished with less air and less fan horsepower. By the use of *Fig. 5*, the theoretical fan horsepower for a tower doing only 90% of standard performance is found to be .031 per sq. ft. of actual tower area or 34.5 hp.

This illustrates how sensitive the fan horsepower is to small changes in tower area. The importance of designing a tower which is slightly oversize in ground area becomes immediately apparent.

Let's assume that we have the same cooling range and approach as used in the first example, except that the wet bulb temperature is lower. The design conditions would then be:

GPM =	2000
Range =	24°
Approach =	8°
T_1 =	92°
T_2 =	68°
Wet bulb temp.-(Twb) =	60°

From *Fig. 4*, we find the water concentration required to perform the cooling is 1.75, giving a theoretical tower area of 1145 sq. ft. as compared with 1000 sq. ft. for a 70° wet bulb temperature. This shows that the lower the wet bulb temperature for the same cooling range and approach, the larger the area of the tower required and therefore the more difficult the cooling job.

The problem of estimating the performance of an existing tower at other than design conditions is often encountered by the plant operator. For example, suppose we have a tower that was designed for the following conditions:

GPM =	1000
Range =	30°
Approach =	10°
T_1 =	110°
T_2 =	80°
Wet bulb temp. =	70°

What will the cold water temperature (T_2) be when the wet bulb temperature (Twb) drops to 60°, providing of course, that the heat load and water quantity remain constant? From *Fig. 4* we find that the water concentration is 2.0 gal. per sq. ft. at design conditions. This water concentration does not change since the volume of water and the tower area remain constant. With the water concentration at 2.0 and the wet bulb temperature at 60°, by adjusting the angle of the straight edge on *Fig. 4* until we obtain a 30° differential between the hot water and cold water temperatures, we find the hot water temperature to be 103°, and the cold water temperature to be 73°.

Suppose that the above designed tower had 1500 GPM flowing through it, and the total heat load remained constant, what would the cold water temperature be when the wet bulb temperature is 65°? The design heat load was

1000x8.33x30=250,000 Btu per minute

The new cooling range (heat load remaining constant) when circulating 1500 GPM over the tower would be

$$\frac{250.000}{1500 \times 8.33} = 20.0°$$

Theoretically, the design area of the tower from *Fig. 4* was 500 sq. ft. (1000 GPM ÷ 2.0 gal. per sq. ft. = 500 sq. ft.) The water concentration when circulating 1500 GPM is

$$\frac{1500}{500} = 3.0 \text{ gal. per sq. ft.}$$

Now, referring to *Fig. 4*. with a water concentration of 3.0 gal. per sq. ft. and 65° wet bulb temperature, adjust the straight edge until a difference of 20° exists between the hot water and cold water temperatures. This shows the hot water temperature to be 100° and the cold water temperature to be 80°.

This indicates that the possibility of a lower cold water temperature obtained by the lower existing wet bulb temperature was lost due to the adverse effect of the increased water quantity.

Fig. 6 shows the type of performance curve furnished by the cooling tower manufacturer. This shows the variation in performance with change in wet bulb and hot water temperature, while maintaining the water quantity constant.

The type of nozzles used in upspray cooling tower distributing systems is shown in *Fig. 7*. The accompaning data in *Table 1* give the performance of a particular family of nozzles. In upspray distributing systems, a pressure of 7 lbs. per sq. in. is common practice; however, 5 lbs. is adequate.

TABLE 1.—NOZZLE CAPACITY TABLE

Nozzle Number	Pipe Size	Orifice Size	PRESSURE IN POUNDS PER SQUARE INCH 5	6	7	8	9	10	12	15	20	25	30
			CAPACITY IN U.S. GALLONS PER MINUTE										
2.4	⅜"	3/16"	....	....	1.0	1.1	1.2	1.3	1.4	1.6	1.8	2.0	2.2
2.4	⅜"	5/16"	1.8	1.9	2.1	2.2	2.3	2.3	2 7	3 0	3.4	3.8	4.2
7	1"	7/16"	6.5	7.1	7.7	8.2	8.7	9.2	10.1	11.3	13.1	14.6	16.0
14	1"	⅝"	11.5	12.6	13.6	14.5	15.4	16.2	17.7	19.8	22.7	25.3	27.8
19	1½"	⅞"	16.8	18.3	19.8	21.1	22 4	23.5	25 8	28.7	32.9	36.5	40.0
24	1½"	1"	20.0	22.0	23.8	25.3	26.9	28.3	31.0	34.7	40 0	44.8	49.0
39	2"	1¼"	33.0	36.2	39.0	41.8	44 3	46.7	51 0	57.0	65.8	73.3	80.0
49	2½"	1-25/32"	39.5	43.0	46.5	49.5	52.5	55.0	60.5	67.0	78.0	86.0	94.0

This nozzle is of the non-clogging type. It does not depend on small orifices to obtain minimum drop-size but, rather, upon centrifugal force. The water is given a spiral action by its tangential entrance into the spiral chamber. The dome-shaped approach to the discharge orifice increases this spiral action as it approaches the discharge orifice. This whirling action, which generates the necessary velocity for fine breakup, assures uniform drop-size and efficient water distribution over a maximum area. This formation of uniformly small drops assures maximum contact with air, resulting in high cooling efficiency.

Atmospheric Cooling Towers

CROSS-sectional view of a typical atmospheric cooling tower is shown in *Fig. 8.*

In atmospheric towers, the water is pumped to the top of the tower, where it is discharged through a distributing system. As the water begins its downward flow, it is broken up and redistributed by the decks that comprise the filling of the tower. This continually creates newly exposed cooling surface for the air (passing horizontally through the tower) to encounter. The redistribution insures even concentration of water throughout the tower during its entire fall.

Although initial cost for an atmospheric cooling tower (designed for a 3-mile wind) is about the same as that for a mechanical draft tower, there are certain important limitations governing its performance. It must be located broadside to the prevailing wind in an exposed area. Any surrounding structures, hills or other barriers would be likely to block off the wind.

Originally, the main objection to atmospheric towers was the excessive spray loss occurring during periods of high winds. This high loss was caused by the lack of a method of separating the entrained water from the air in the conventional louver-type tower. As a result, most manufacturers now have solved this problem by means of incorporating drift eliminators into the louvers.

The method of determining the size and performance of an atmospheric type tower is shown on the accompanying charts. The purpose of these charts is to show the method of estimating the approximate size of an atmospheric type cooling tower to meet a given demand. *The cooling capacity of any tower, with a given wet bulb temperature and wind velocity, varies with the water concentration.* Thus, the problem of calculating tower size becomes nothing more than obtaining the correct water concentration for one of chosen height, which will operate under a certain wind velocity and wet bulb temperature. Once this water concentration factor is obtained, the area of a given height tower can easily be calculated by dividing the gallons per minute circulated by the concentration factor.

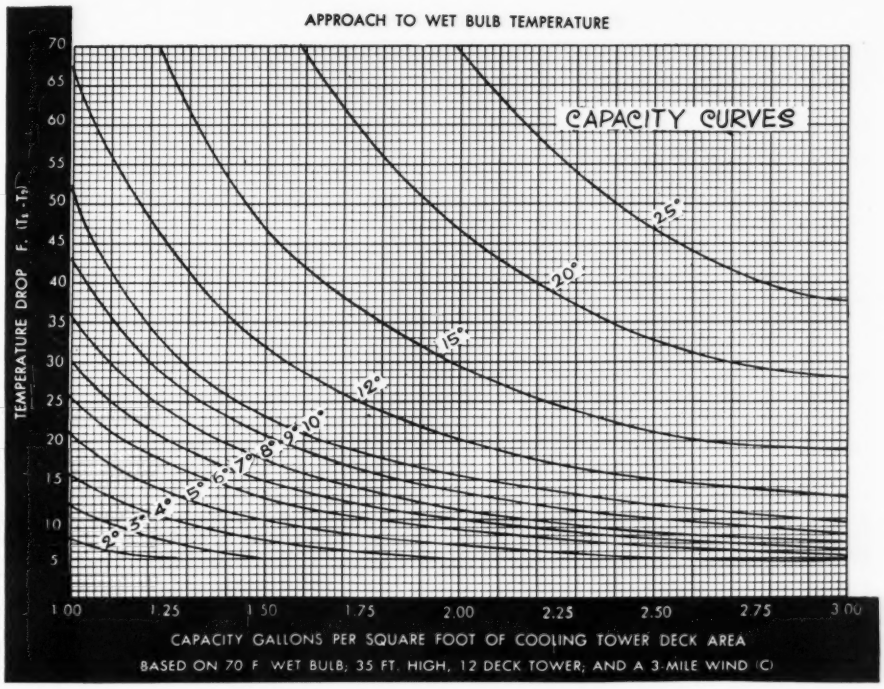


Fig. 9. Capacity curves for atmospheric type cooling towers.

The concentration required to produce desired cooling depends primarily on the following conditions:

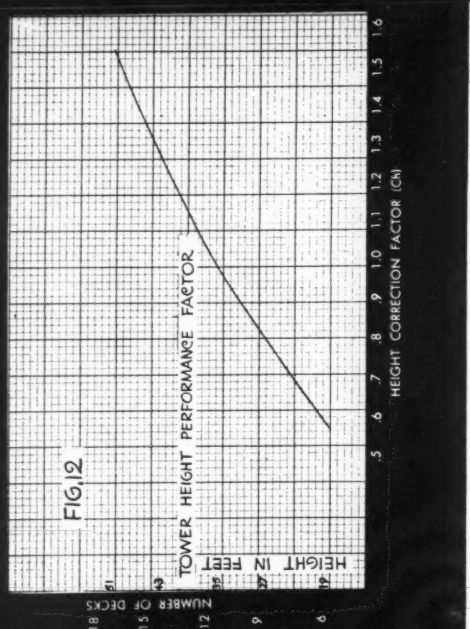
1. Temperature range (T_1—T_2)
2. Approach to wet bulb temperature (T_2—Twb)
3. Tower height
4. Wind velocity
5. Wet bulb temperature (Twb)

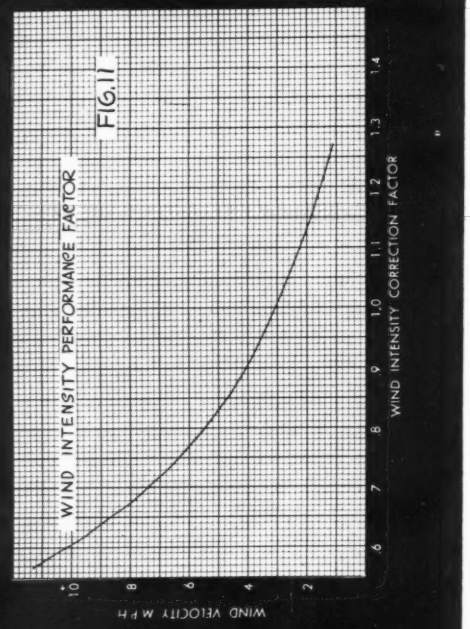
It is easily seen that because of the infinite number of possible combinations of these values, it is impractical if not impossible to have one curve from which to obtain the correct concentration factor. *Fig. 9* gives the required concentration for cooling water through a certain range and with a certain approach to the wet bulb temperature, *but* this curve assumes a wet bulb temperature of 70° F., tower height of 35 ft. and a wind velocity of 3 mph. Let us assume that the conditions given are unity. Then should any of these three values change, the concentration would have to be corrected for the new conditions by using one or more of the correction factors shown on *Figs. 10, 11, 12.*

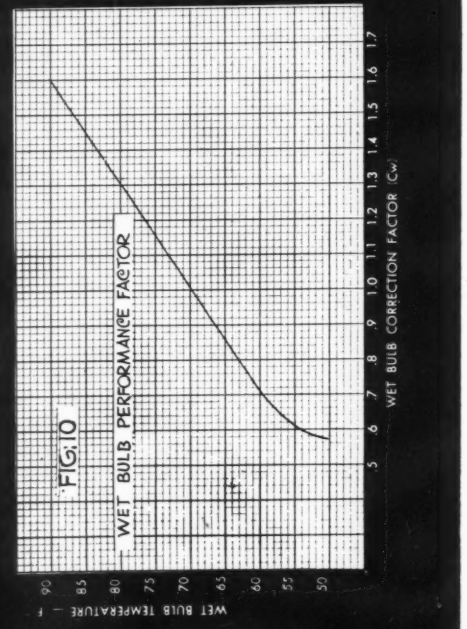
Let us see how a variance of any of the three aforementioned conditions would affect the concentration of water.

1. *Wind Velocity.* The higher the wind velocity the greater the amount of air that goes through the tower. This results in greater cooling. Therefore, when the wind velocity is higher, the concentration can be greater and still obtain equal cooling.[3]
2. *Tower Height.* In general, it is found in atmospheric as well as mechanical draft towers that the greater the cooling range and the closer the approach to the wet bulb temperature, the higher will be the tower required to give sufficient time of contact between water and air to accomplish the desired cooling. In atmospheric towers, the performance is limited by both maximum and minimum water concentrations. Should the water concentration fall below 1 gal. per min. per sq. ft. of tower area, it will be necessary to employ the next size

[3]In deciding upon a design wind condition, it is well to bear in mind that there is a period occurring during the day and night in which the prevailing wind shifts. When this occurs, there is a short period when there is little or no air movement. During such period, the tower water temperatures will rise from 2 to 5 degrees, depending on the duration of the calm and the design wind velocity. This should be evaluated in determining a design wind velocity. However, one should be aware of the fact that many atmospheric towers are designed to operate successfully at a zero wind condition.







Figs. 10, 11, and 12. Performance factors used to compensate for variance in values of temperature, wind intensity and tower height, to determine proper concentration.

higher tower. This is because in extremely light water concentrations the water will not be uniformly distributed and the performance as predicted by the accompanying curves will not be achieved. Should the water concentration exceed 3 gallons per minute per sq. ft. of tower area, it will then be necessary to choose the next size lower tower. The higher water concentrations tend to blanket the tower and will not allow sufficient air to pass through to accomplish the cooling shown on the curves.

3. *Wet Bulb Temperature.* Theoretically, a cooling tower cannot cool water to a temperature lower than the prevailing wet bulb temperature. Being limited by this fact, one is more interested in the economic approach of the cold water temperature to said temperature. Air has a greater capacity for absorbing heat at the higher wet bulb temperatures. At the lower wet bulb, air, in passing through the tower, must have a greater temperature rise to accomplish the same cooling. Therefore, to obtain the same approach at the lower wet bulb temperatures it is necessary to reduce the concentration.

To calculate the size of an atmospheric type cooling tower with effective width of 12 ft., the following general formula may be used:

$$L = \frac{GPM \times W}{C \times 12 \times Cw \times Ch}$$

when:

L	=	Length of tower in feet.
GPM	=	Quantity of water in gal. per minute.
W	=	Wind correction factor.
C	=	Concentration of water per sq. ft. of cooling tower area.
Cw	=	Wet bulb correction factor.
Ch	=	Tower height correction factor.
T_1	=	Inlet temperature.
T_2	=	Outlet temperature.
$(T_1—T_2)$	=	Temperature range.
Twb	=	Wet bulb temperature.
$(T_2—Twb)$	=	Approach to wet bulb temperature.

The general information given is presented solely for the purpose of showing the more important factors that affect the design of atmospheric type cooling towers. Space does not allow consideration of the effect of excessive or insufficient concentration, higher relative humidity, change in wind directon, and other finer points which must be analyzed for proper cooling tower selection. Therefore, it is to be noted that the cooling tower sizes calculated in the above examples are only approximate. This survey, while presenting the essentials, has purposely been kept as non-technical as possible in order that it may serve as a guide to the plant operator in evaluating cooling tower performance.

PROBLEMS IN TOWER LENGTH AND TEMPERATURES

PROBLEM NO. 1: Determine the length of a 35-ft. high tower required to cool 1500 GPM from 90° F. to 75° with a 70° F. wet bulb temperature and a 3 mph wind. From these conditions we know that the approach $(T_2—Tw)=5°$ F. and the range $(T_1—T_2)=15°$ F. From *Fig. 9*, it is found that these two valves require a concentration of C=1.17. The correction factors, Ch, Cw and W will be equal to one, as shown on their respective correction factor curves, because *Fig. 9* was based upon values equal to those given in the problem. Substituting the corresponding values on the above formula we find that a tower 107 ft. long is required.

PROBLEM NO. 2: Let us take the same conditions that exist in Problem No. 1 and see what the effect would be when the wind velocity is increased to 5 mph. From Fig. 12, when the wind velocity is 5 mph, W = .80. Substituting this value for W in the formula, we find that an 85.3-ft. long tower is required.

PROBLEM NO. 3: Again assume the same conditions as in Problem No. 1, except that due to space considerations it is necessary to have a 51-ft. high tower. From *Fig. 11*, when tower height is 51 ft. Ch = 1.63. Substituting the new Ch in the formula we find that a 65½-ft. long tower is required.

PROBLEM NO. 4: Assume the conditions of this problem are identical to those of Problem No. 1, except that water has to be cooled from 85° F. to 70° F. and the wet bulb temperature is 65° F. From *Fig. 10*, when the wet bulb temperature is 65° F., Cw = .86. Substituting this factor in the general formula we find tower length to be 124 ft.

PROBLEM NO. 5: Once a tower is installed there often arises the problem of determining what cold water temperature one can expect under conditions differing from those for which the tower was designed. For example, let us take the tower calculated for Problem No. 1. This tower is 35 ft. high, 12 ft. wide, and 107 ft. long. What cold water temperature, T_2, can be expected when the wet bulb temperature is 60° F., wind velocity 4 mph, cooling range 15° F., and water circulation 2000 GPM?

The wet bulb temperature correction factor Cw from *Fig. 10* is .71. The wind velocity correction factor (W) from *Fig. 12* is .875. By substituting these values in the general formula and solving for water concentration, we find:

$$C = \frac{2{,}000 \times .875}{107 \times 12 \times .71 \times 1} = 1.92 \text{ gal. per sq. ft.}$$

Turning to *Fig. 9* we find that when the cooling range is 15° F. and the water concentration is 1.9, the approach to the wet bulb temperature is 9° F. This means that the cold water temperature will be 60° F. + 9° F. = 69° F.

PRORATION and RATABLE TAKE

Feasibility and Possibility of a Statewide Plan

"Statewide gas proration is an ideal system to strive for, and as our gas reserves increase it is the only method that can be used to prevent selective buying. Under such a system, each field can be allocated an allowable, based on an efficient withdrawal, that will prevent premature encroachment and coning of water." The elements of a plan for statewide proration in the interest of accelerating conservation are discussed herein.

CONSERVATION, in its larger sense, has been defined as "a wiser and more efficient utilization of our natural resources." The conservation of oil and gas not only implies a better utilization of these substances after they have been produced, but deals with those engineering principles which will result in a greater ultimate recovery from the reservoirs of the present producing fields, as well as those yet to be discovered.

Our reserves of natural gas, although apparently abundant at present, are limited and irreplaceable; and any production method which tends to bring about waste of these reserves is contrary to the public interest.

The economic necessity for the conservation of these natural gas reserves lies in the importance of preventing preventable waste of this limited and exhaustible natural resource, which exploitation can perchance be subject to the effects of selfish and short-sighted operations. The interests of the oil and gas producing states and the public consist in conserving gas for beneficial uses for which it is adopted and in conserving the gas energy in reservoirs as a medium of increasing oil production. The economics of natural gas and oil are intermingled further in such uses of natural gas as the operation of natural gasoline plants, repressuring and recycling plants, and fuel for exploration, production, and refining of oil. Any form of conservation, therefore, as applied to natural gas, affects both the gas industry and the oil industry.

Any form of conservation and proration must give careful consideration to the rights and interests of land owners, lease owners, well owners, oil and gas producers, pipe lines, and public interest. Practical operating conditions arising out of the occurrence of natural gas with oil, the feasibility and necessity of producing the two together, and the necessity and desirability of conserving the gas energy under pressure in the reservoir must be weighted against the feasibility of such conservation by returning gas to a reservoir when the gas cannot be sold for industrial or any other legal use.

Legislation has enabled some of the oil and gas producing states to end some of the intolerable and profligate waste of natural gas which was formerly taking place. The more obvious forms of waste such as the blowing of wells completed high on top of a structure in the hope of causing them to produce oil, wells being produced with inefficient gas-oil ratios, the completion of wells in such manner as to permit the escape of gas from a gas producing horizon overlying an oil producing horizon to other porous strata, and many others, consequently, have been eradicated in many states, but the efforts toward gas proration, which are designed to curtail subtle types of waste occurring within reservoirs through the premature encroachment and coning of water, have thus far met with substantial reverses.

The information and knowledge obtained from the establishment of oil proration has not proved of much assistance in the proration of gas because of the inherent differences between oil and gas. Devices which are expedient in the proration of oil do not necessarily apply in the proration of gas; and, therefore, it has been necessary to start from the beginning.

When the state prorates gas from a gas reservoir or from a gas cap overlying an oil zone in the interest of conservation, the orders doing so must be fair and reasonable and protect correlative rights of the owners of the pool. A formula for the allocation of production within a field must meet two basic requirements: First, it must prevent waste; and, second, it must distribute the allowable ratably among the wells in such a manner that each owner will have the opportunity of obtaining his fair share of the production.

To obtain the aims of a proper allocation program, the following principles should be applied.

1. The allowable assigned to a well or tract should depend, in part, upon its current average ability to produce.
2. The allowable of a well or tract should depend, in part, upon the proportion its production acreage bears to the total productive acreage of the field as a whole; the amount of acreage to be assigned to the well for allocation purposes to depend upon the spacing pattern and proration unit assigned for the particular field.

The factors involved in any proration program include potentials, acreage, deliverability, rock-pressure,

By JACK K. BAUMEL*

* Chief Engineer of the Railroad Commission of Texas and member of the Research and Coordinating Committee of the Interstate Compact Commission. From a paper presented at the meeting of the Interstate Compact Commission Dec. 9-11, 1946.

reservoir pressure, and volumetric withdrawal. It is believed, therefore, that proper factors can be chosen which, in proper combination, will furnish a sound allocation formula. It is the opinion of the writer that no single factor can be used in allocating allowables within pools because no single factor can prevent waste and give equity; each pool must be considered upon the facts found therein. The most important factor in any gas proration formula is acreage. More weight should be given to it than any other factor in order to minimize drainage across property lines and to discourage unnecessary drilling. The potential factor is widely used in allocating gas production in many states. This factor is subject to considerable misuse and many engineers have condemned the potential factor as being inaccurate and wasteful. Another important factor which should be used in a gas proration formula, as a corrective factor, is reservoir pressure. This factor should be used in conjunction with the acreage factor, since it does bear some relation to structural position and some relation of depletion of a tract. This factor will also act to adjust the allowables in a way as to reduce the effects of non-ratable withdrawals.

IT is a well known fact that conservation requires restriction of production. Restriction of production brings about the problem of allocating the restricted production among the fields and then allocating the allowable ratably among the producers in the field. The question of statewide gas proration is a new problem that will require a great deal of study as to the feasibility of such a venture, and as to what good can be accomplished in the way of preventing waste.

The technique for statewide gas proration, when feasible, should follow substantially the same plan adopted for oil proration. The plan adopted for oil, as in Texas, involves statewide production control. In Texas, to prevent excessive and wasteful storage and losses from evaporation and leakage, the total production from the state is limited, after notice and public hearing, to a figure found by the commission to be an amount needed for the ensuing month based upon reasonable market demand. This amount, or the total state allowable, is next divided among the fields, based upon efficient rates, in order that each field may have its fair share of the total state allowable; then the field's allowable is prorated to the wells, based upon the field's allocation formula. The orders or regulations of the commission have the effect of preventing waste, thereby increasing the ultimate recovery of oil and gas from the fields of the state; and, at the same time, to give each operator the opportunity to produce his share of the oil and gas in the field.

Born in Russia, Jack K. Baumel came to the United States in 1921. He was graduated from the University of Texas in 1937 with a B.S. degree in chemical engineering, and did graduate work in petroleum engineering.

Employed by the Railroad Commission of Texas in its Oil and Gas Division as junior engineer in May, 1937, he was placed in charge of all gas-oil ratio work. He was later made senior engineer, his duties also entailing supervision of bottom-hole pressures, research, and study of the equilibrium phase of liquid hydrocarbons.

In 1940 Mr. Baumel was made chief enforcement officer of the Oil and Gas Division, and in 1942 became director of production, which position placed him in charge of proration and production of oil and gas fields throughout the State of Texas. On January 1, 1946, he was made chief engineer of the Railroad Commission's Oil and Gas Division, which position he now holds. The Oil and Gas Division has charge of conservation and proration of oil and gas in Texas, incorporating gasoline plants, refineries and pipe lines.

The reasons for limiting the production of oil to a statewide production control cannot in all cases be applied to gas promotion. Its fugacious characteristics are such that wasteful storage, losses from evaporation, and leakage due to above-ground storage do not apply to gas. The market for gas is limited by the capacities of the lines, seasonable peak loads, and consumers' demand at the end of the line.

A gas company will lay a line to a field only if it can be assured by an adequate reserve over a period of years, while an oil purchaser will, many times, lay a line to a field having only one or two wells. Then, too, there are the interstate and intrastate features of the gas business and the fact that part of the interests involved are subject to general public utility regulation and the Federal Natural Gas Act, while other parts are conducted as unregulated competitive ventures.

AS a whole, the problem of statewide gas proration is somewhat different from the problem of statewide oil proration. It has been argued that gas pipe lines are not common carriers in the same sense as oil pipe lines. However, the legislature of Texas has declared a person operating a gas pipe line to be in the business of a public utility and in a business involving public interest. From a practical standpoint and under proper factual conditions which are reasonable and economically feasible, the legal fact that a gas line is a public utility and a common purchaser, if not a common carrier, would permit distribution of markets as between fields. As an example of what is meant by the above, and specifically applying it to Texas, it can easily be seen that it would be economically infeasible and impractical to take the market demand of the Panhandle field in Texas plus the market demand of the Carthage field in Texas and allocate the total demand from the two fields on any basis other than the demand from each separate field—because, geographically the fields are located far apart, and furthermore the pressures in the fields are at a wide variance. On the other hand, where a gas pipe line is reasonably accessible to a field other than that from which it is originally connected, and when the gas from the other fields can be delivered at the approximate pressure at which the line is equipped to take it, there is no reason why a regulatory body under proper authority from its legislature could not prorate the market between them—considering, of course, all relevant factors. In some states other than Texas it could very well be that this condition would exist in the state as a whole. I understand that in South Louisiana, as an example, many gas fields are located relatively near each other and that the gas exists in rather large quantities at the same approximate pressures. This situation, whether in Louisiana or any other state, to my mind, provides a practical situation from which gas proration between fields could be accomplished to prevent the very undesirable result of selective buying.

As an example of the difference between oil pipe lines and gas pipe lines: many of the oil purchasers and pipe lines are interconnected so that if a purchaser of oil does not get his demand from a certain field he can purchase the same type of crude needed from another field, or another purchaser, through the means of interconnected network of pipe line systems throughout the state; or in case there is no line to the field and oil has been allocated to it, the oil can be trucked out; but in the case of gas, many fields have no connections and the pipe lines are not interconnected, so that if a part of the market demand is allocated to a field that has no connection, or is allocated to a field above market demand, the allowable of gas for that field is lost and the purchaser finds himself short in meeting his demand.

Statewide gas proration is an ideal system to strive for and as our reserves increase that is the only method that can be used to prevent selective buying. Under such a system each field

can be allocated an allowable, based on an efficient withdrawal, that will prevent premature encroachment and coning of water; and the amount allocated to each pool or field should then be allocated, based upon a formula containing the factors given in the beginning of this paper, in order that each producer may have a fair share in the field's production.

THE history of gas proration in Texas is in the main a story of recent events and a battle in the courts.

The Railroad Commission of Texas has recognized that gas must be prorated in fields in order to have ratable taking. Prior to the Corzelius Case the Railroad Commission of Texas prorated gas only in cases where physical waste occurred. However, the decision of the Corzelius Case gave the commission power to prorate gas not only to prevent physical waste but to protect correlative rights.

The specific statute under which the commission operates states that it was enacted for the protection of public and private interests against the evils of the production and use of natural gas under wasteful conditions by prohibiting such waste and by compelling ratable production.

Art. 6008, Sec. 10, of the statutes reads as follows:

"It shall be the duty of the commission to prorate and regulate the daily gas well production from each common reservoir in the manner and method herein set forth. The commission shall prorate and regulate such production for the protection of public and private interests:

"(a) In the prevention of waste as waste is defined herein;

"(b) In the adjustment of correlative rights and opportunities of each owner of gas in a common reservoir to produce and use or sell such gas as permitted in this article."

At the same time to distribute the allowable ratably among wells in the field, based on the allocation formula adopted for that field after due notice and hearing, the commission distributes the allowable, based upon such formula, to all wells in the field whether they have connections or not. This is done according to Art. 6008, Sec. 20, which reads as follows:

"In the event the commission finds that the owner of any gas well has failed or refused to utilize or sell the allowable production from his well, when such owner has been offered a connection or market for such gas at a reasonable price, such well shall be excluded from consideration in allocating the daily allowable production from the reservoir or zone in which same is located until the owner thereof signifies to the commission his desire to utilize or sell such gas. In all other cases all gas wells shall be taken into account in allocating the allowable production among wells producing the same type of gas."

Operating under the statutes previously referred to, the commission has done these things with respect to the regulating of production of gas in Texas:

1. It has promulgated a general rule of statewide application which rule applies in the absence of a specific rule. This general rule limits the daily take from gas wells to a quantity not to exceed 25% of its open-flow potential capacity.

2. With respect to the production of casinghead gas, it has also promulgated a statewide rule which applies in the absence of a specific field rule, which statewide rule sets up a permissible gas-oil ratio of 2000 cu. ft. per barrel. If the production of such quantity of gas per barrel of oil is deemed to result in an inefficient use of gas, then, after notice and hearing, it may prescribe a permissible gas-oil ratio which testimony shows will result in the efficient utilization of gas to produce the oil. In some fields this permitted ratio is as low as 500 cu. ft. per barrel; whereas, in other fields it may exceed 2000.

3. Another way that the commission has sought to obtain the greatest utilization of the gas contained in a reservoir that is productive of both gas and oil is to allow the closing in of the wells that produce with ratios in excess of that prescribed by the commission and to permit the transferring to and production from other wells of the allowable of such closed-in wells, provided that the transferred oil is produced from wells that operate with gas-oil ratios lower than the operating ratio of the wells from which the oil is transferred.

4. The commission has always advocated and encouraged picking up casinghead gas from oil wells and returning it to the producing formation where such is necessary for reservoir pressure maintenance, and where such practice can be shown to result in a greater ultimate recovery of oil and gas from the reservoir. Many applications of such nature have been made and seldom does a week pass without hearing on some such application.

With respect to reservoirs that are productive of gas only, it might be well to point out that most of these reservoirs in Texas, so far as potential capacity is concerned, lie along the Gulf Coast area, and in what we refer to as the Panhandle District. For several years the commission has been prorating natural gas in the Panhandle field, which is one of the largest gas reserves in the nation. Gas proration schedules are prepared monthly for the purpose of allocating among the various wells their proportionate part of the gas outlet assigned the field. Other fields in which gas is being prorated in Texas are the Alief, Blue Lake, La Blanca, Carthage, Navarro Crossing, Oakwood, Rodessa, Whelan, Sipe Springs, Eden, South Weslaco, McAllen, and the North Louise field.

The reasonable, lawful, required production from any of the above fields is determined from nominations for the production from gas wells producing from each separate reservoir or zone, which are submitted to the commission in affidavit form by purchasers of gas from the fields in question, and the commission may, if there is a question with reference to nominations, adjust the allowable production, as determined by the above method, to the actual production from such reservoir or zone as it may determine from its records to be the most efficient rate in order to prevent waste. The allowable or production from each field is then distributed based upon the allocation formula for each field in question on a basis of 2/3 rock pressure times acreage plus 1/3 potential, or ½ acreage times rock pressure plus ½ potential, with the proration units ranging from 160 acres in some fields to 640 acres in other fields.

The Carthage field is prorated on 100% acreage times reservoir pressure, allowing 640-acre proration units.

ANOTHER conservation measure which the commission has been putting into effect in an effort to make the most efficient use of gas in a reservoir that contains both gas and oil is to place a volumetric displacement on the gas wells. Such a rule is designed to permit any gas well to void as much space in the reservoir daily as does an oil well producing from the same reservoir. It does not deny the rights of the operator that is situated in the gas cap area, but simply restricts his production of gas to a reasonable amount primarily for the purpose of preventing an undue rise in the gas-oil contact and the migration of oil from the oil column into the dry gas sand.

The application of the volumetric displacement rule has been instituted in a number of fields in the state.

With respect to orders of the commission concerning fixing of efficient gas-oil ratio limits within which oil wells may be produced, it would be well to point out that as early as 1937-38 the commission instituted periodic gas-oil ratio surveys in the various

TABLE 1. UTILIZATION OF CASINGHEAD GAS

Item	When All Existing Conservation Projects are Completed Volume	%
Lease Fuel System	71	2.5
Extraction Loss	75	2.7
Plant Use and Fuel	173	6.2
Gas Life	31	1.1
Pressure Maintenance and Repressuring	427	15.3
Recycling	30	1.1
Carbon Black	372	13.3
Transmission Lines	1,107	39.4
Vented	514	18.4
	2,800	100.0

(Figures in millions of cubic feet per day)

fields where gas was a problem. In the application of these rules, a gas well that produces with a ratio in excess of that prescribed by the commission has its oil allowable reduced—the effect being that the high ratio well is allowed to produce as much gas from the reservoir in the production of its oil allowable as does a like well producing with a ratio within the limits prescribed by the commission. In many fields surveys were formerly quarterly or semi-annually; since the war emergency, most of the periodic surveys are on an annual basis.

The effect of such a rule is twofold in nature. First, it makes the operator conscious of gas when he is completing his well and makes toward a better well completion. Second, it has the effect of promoting workover operations where wells were originally so completed that the casing was set high and resulted in a penalty to the oil allowable.

Another type order which the commission has entered with the purpose of encouraging the return of gas to the producing formation in oil and gas producing reservoirs provides that credit against the producing gas-oil ratio may be given for gas that is currently injected to the same formation from which it is produced. The application of such an order encourages injecting gas to the producing formation, since if there results therefrom a producing ratio in excess of that prescribed by the commission the operator may secure credit against this gas withdrawn for the gas that he has injected. This type of order does not penalize the operator in his oil allowable, if he injects a sufficient amount of gas to offset that which he has produced.

UNDER sound engineering and gas conservation practices prescribed and enforced by the Railroad Commission of Texas the venting of gas to the air has been reduced from 384 billion cu. ft.; or 37.43% of all the gas produced in the state in 1935, to 55 billion cu. ft., or 4% of all the gas produced for the first six months of 1946. Most of the gas that is being wasted or vented to the air is casinghead gas which comes from oil wells, always a problem in preventing gas waste. However, the commission has recently inaugurated a program to stop much of this waste, and has achieved astounding results.

During the months of February, March, and April of 1946, the Railroad Commission held hearings in Corpus Christi, Houston, Fort Worth, and Midland, at which hearings it received reports from the industry as to the status of all conservation projects, then under consideration, dealing with the elimination of the flaring of casinghead gas in Texas at that time.

As a result of these hearings and the data received from the industry as of November 1, 1946, it is shown that nine projects conserving 52 MMcf of gas per day have been completed, 16 projects conserving 221 MMcf of gas per day are in various stages of construction, and 44 plants designed to save 485 Mcf of gas per day are being planned. The projects already completed have cost $8.5 million. These projects now under construction will cost $43,740,000, and those being planned will cost $75,090,000, or a total of $127,330,000. Figures submitted to the commission showed that out of the total casinghead gas produced in March, 1945, 57.3% was flared to the air. The new projects under construction will reduce the total casinghead gas flared by approximately 900 MMcf per day, and when all the existing projects are completed 18.4% of the total casinghead gas produced will be flared.

Table 1 shows the utilization of all casinghead gas produced when all existing conservation projects are completed in the State of Texas.

In addition to the above conservation projects, it is believed that an addition of from 200 MMcf to 300 MMcf of casinghead gas per day now flared may be and can be conserved, if the State of Texas and the operators completing these projects and those projects being planned in the future could be guaranteed that the threat and the encroaching powers of the Federal Power Commission would be curbed. It is believed that the threat of encroaching powers of FPC is a threat to the conservation of casinghead gas, in that, having succeeded in regulating the well-head price of casinghead gas by the natural gas companies, the commission is now seeking to control sales at the well-head by producers who are not gas utilities.

Solving Peak Shaving Problem

Gas air equipment producing 75,000 c.f.h. was recently installed at the Seattle (Wash.) Gas Co. Unit at left manufactures 25,000 c.f.h.; large unit at right produces 50,000. Shown in photo are Norman E. Almquist, chief chemist, left, and George Thayer, production control superintendent, Seattle Gas; and W. O. Thompson, engineer, Pacific Gas Corp.

"Handy Flame" Tells

What An Advertising Character Can Do

By W. H. ROHR, Jr.
Handy Flame
Indianapolis, Ind.

TO make gas utility advertising more interesting and thus more effective . . . to give utility sales programs greater continuity . . . to make better friends and better customers for any gas company.

That's the ambition of "Handy Flame," the copyrighted advertising character we introduced recently to the gas industry. Now available to all gas companies, Handy Flame has already gone to work for The North Shore Gas Co. of Waukegan,, Ill.

Handy Flame was born on a destroyer in the Pacific while I was trying to impress an electrician's mate with my knowledge of the gas flame. After drawing the flame, I added flame-like arms and legs. The result was the first rough drawing of Handy Flame.

After the war I turned my crude sketches over to Ed Murphy, a commercial artist in Indianapolis. Together we worked and reworked the figure for nearly a year before we were finally satisfied.

We feel that Handy Flame is a happy combination of humor, personality and action . . . a character that not only symbolizes modern gas service readily, but sells that service in a personal, friendly manner—the way customers like to be sold.

Here are some of the reasons why we believe that Handy Flame—or any other well designed character—is a good investment for gas companies that are out to do a more effective sales job:

1. **Such a character promotes a friendlier and more personal relationship between company and customer.**
2. **An advertising character opens up a new and wider field for advertising and sales promotion by providing an additional, ever-ready and inexhaustible source of ideas to put any sales message across.**
3. **A character that is easily and quickly adapted to meet any sales objective saves valuable time for advertising personnel.**
4. **A clever advertising character, like a clever cartoon, has universal appeal . . . will get more attention and be remembered longer than almost any other form of illustration.**
5. **An advertising character is an excellent means of giving the entire advertising and sales promotion program greater continuity. It ties together every phase of each campaign . . . and ties one campaign in with another.**

To show some of these points in actual practice, let's consider a couple of hypothetical promotion problems:

Problem No. 1. We'll assume that you have the job of planning an automatic water heater campaign.

Solution. You decide on the theme, "Kick Out The Kettle." Incidentally, this campaign was carried on very successfully some years ago by United Gas Corp. of Houston, Texas, while I was with their advertising agency, Bozell & Jacobs. You illustrate the theme by showing Handy Flame booting a battered tea-kettle out the back door. Here in one illustration is the key to the entire campaign. It can be used over and over again—on the brochure outlining the campaign to salesmen and dealers, in newspaper ads, on displays and bill inserts . . . right on down the line.

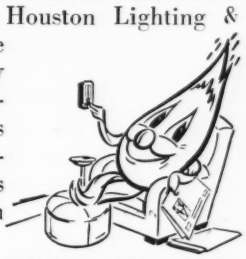
The character in this case not only adds humor, but through repetition serves to tie the whole campaign together. Also it ties this campaign in with other campaigns.

Problem No. 2. You want to design a delinquent notice that asks for payment due in a friendly manner.

Solution. You show Handy Flame at the customer's door, reminding him, "Say boss, you forgot my pay." Few customers will find anything objectionable in a notice of this type.

Problem No. 3. Let's consider a situation involving dealer-utility cooperation. We'll assume that you have a three-fold objective: (1) to acquaint customers with approved appliance dealers; (2) to get dealers to coordinate their sales promotion with yours; and (3) to promote dealer good will.

These were problems I dealt with before the war, as a dealer sales counsellor with the Houston Lighting & Power Co. Since our company also sold appliances and was therefore in competition with its dealers, you can appreciate the problem we had on the good will score.



Handy Flame says: This is the way to fire an automatic Gas furnace.

Solution. To meet this three-way problem, you design a decalcomania emblem with the wording, "Gas Appliance Dealer," and an illustration of Handy Flame. Such a design is already available to Handy Flame subscribers.

You reproduce this emblem and run off a supply of mats suitable for use in newspaper advertising. Now, with the decal and mats, you're all set to sell your dealers a promotion idea that helps them as much as it helps you.

Such an idea might be worked out along these lines:

Your dealers display the decal in a prominent spot on their door or window and reproduce it in their advertising. You also run the emblem in your appliance advertising, along with a suggestion such as, "Look for the dealer who displays Handy Flame." This direct tie-in between utility advertising and dealer advertising can be supported with appropriate display material supplied to dealers for each campaign. In your "Kick Out The Kettle" campaign, for instance, a display card showing Handy Flame drop kicking a kettle fits right into the picture. Gas companies ready today with this kind of dealer promotion are going to find smoother sailing in the competitive selling days ahead. For this type of cooperation fosters lasting dealer good will . . . and gives the dealer good reason to put your display material where you want it—in his window and floor displays.

Five ways to use Handy Flame—billboard, display card, wood cutout, decal, ad—are illustrated in rough form below. Figures in margins are three of 12 electros for use in ads, bill inserts, booklets, sales folders, letterheads, etc.

SAFETY PRECAUTIONS

When Installing Propane-Air Mixtures

By L. R. WENZEL
Vice President, Gas Inc.
Lowell, Mass.

THE properties of propane and butane which make them of economical value to the gas industry also present hazards requiring proper design of equipment and safe methods of handling to prevent accidents.

Safety standards have been developed from extensive research, testing of equipment, and years of experience. Safe practices and standards have been established as a result of cooperation of the liquefied petroleum gas industry with regulatory and insurance bodies such as the National Fire Protection Association, Association of American Railroads, Interstate Commerce Commission, and the National Board of Fire Underwriters. These organizations, whose primary thought has been to eliminate hazards and to promote safety in every way possible, have developed standards which kept accidents resulting from equipment failure to a minimum. Practically every accident connected with the transportation or utilization of liquefied petroleum gases has resulted because the person involved lacked sufficient knowledge of the product involved.

Before discussing any standards which are safety precautions, it would be well to discuss some of the inherent characteristics of propane and butane, in order to appreciate more fully the need for the standards. These gases are obtained commercially from either natural gas or from gases produced in the refining of crude oil, and are extracted by the absorption process, by compression, or both. By application of moderate pressures, these gases can be changed to a liquid state and in this concentrated form permit economical shipping, storing and handling. A tank car of approximately 10,000 gal. capacity has a Btu equivalent of approximately 1.75 million ft. of manufactured gas. At atmospheric pressure, propane boils at minus 45°F and at 70°F develops approximately 125 psig pressure. Butane has a boiling point of 32° F at atmospheric pressure and at 70° F develops approximately 34 psig. It is evident, therefore, that at room temperature and at atmospheric pressure both of these fuels would be in a gaseous form, but because of their characteristics, can be kept liquefied at room temperature with moderate pressure.

Propane and butane have five characteristics different from the gases with which gas utility men are most familiar. Characteristics which must be known by persons handling and utilizing liquefied petroleum gases follow:

1. They are normally gases, but are generally stored and transported as liquids under moderate pressure.

2. They are non-poisonous and odorless in their normal state.

3. As gases, they are heavier than air.

4. Combustible mixtures can be formed with lower percentages of gas-air mixtures than most other gases, but the total combustible range is narrower.

5. The pressure exerted by liquefied petroleum gas in a container is entirely dependent on the temperature of the contents.

Users of liquefied petroleum gases should always remember that although these gases are transported and stored as liquids for economy and convenience, they are normal gases and when liberated at normal atmospheric pressure and temperature must be treated as gases and not liquids. The Bureau of Explosives officially classifies them as "flammable gas." In case of an emergency, propane and butane should be treated as a gas and not a liquid. Since these gases are stored in liquid form under pressure, a container will hold this product in both the liquid and gaseous phase in equilibrium.

THE toxic properties of propane and butane are so slight, that for practical purposes, they may be said to be non-toxic. It is true that they may cause death by suffocation in cases where not sufficient oxygen is present. The mild intoxicating effect should be sufficient to warn a person of high concentrations of these componds, even though the vapors are not stenched. If necessary to work in an atmosphere containing propane or butane vapors, an air hose and mask should be provided, although if possible, it is better practice to purge or ventilate the tank or room in order to avoid the hazard of fire or explosion.

Propane and butane vapors are odorless in their normal state. Addition of an odorant in specified concentrations is in accordance with the standards established by the National Board of Fire Underwriters. These standards have been adopted as regulations by many states and even though state laws may not require the odorant, distributing companies make it a practice to odorize all products shipped.

In direct contrast with manufactured gas, these gases are heavier than air. Compared to air at 1.0, the specific gravity of propane is 1.52 and butane 2.01.

The specific gravity of manufactured gas varies from 0.40 to 0.70 depending upon the manufacturing process used. It is, therefore, important to remember that ventilation must be provided at floor levels instead of at upper room levels, as is the case with manufactured gas. Consideration should be given to the elimination or proper ventilation of pits.

The limits of inflammability for propane in air are 2.4 to 9.6% and for butane 1.9 to 8.6%. This compares to manufactured gas at from 8 to 30% Although a lower percentage of gas to air is required for combustion, the range is only approximately one-fourth that of manufactured gas.

The last and probably most important of the characteristics listed above for the safe handling, storing and transporting of propane and butane is that the pressure inside the container is entirely a function of the temperature of the contents. If, due to an in-

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crease in temperature of the contents, excessive pressure is developed in the container, there are two methods of reducing it: (1) By discharging gas from above the liquid, or (2) by reducing the temperature of the contents. It is naturally preferable to reduce the temperature of the contents rather than permit the escape of high pressure gas with its resultant potential hazard.

THE first handling of propane or butane with which most utility companies using these products are concerned is in car movements. These cars are of special design, and the Interstate Commerce Commission regulations provide the specifications for their construction. These rules do not allow any bottom connections to the tank, thus eliminating possible valve leakage. The gas is handled through connections in a manhole cover at the top which is not removable except for repairs or inspection. This arrangement controls the escape of vapors. The filling and discharge lines of these cars must be equipped with automatic excess flow valves, so as to shut off the flow of the product in case of a break in the unloading connection. Although many of these cars have been in serious wrecks, records indicate that in no case has a tank been ruptured or fittings mechanically damaged to a point where they did not perform the function for which they were intended. In cases where fire has originated from other sources causing an increase in the temperature of the liquid, safety relief valves have operated to prevent excessive pressure in the tank. Because of the fine safety record which is a result of the special construction of these cars, the American Railway Association is more liberal in its recommended distance from passenger rail lines to unloading sites for these cars than for oil and gasoline cars.

Propane or butane is unloaded from tank cars either by the use of liquid transfer pumps or by the pressure differential method. Unloading equipment should be constructed and installed in accordance with the Standards of the National Board of Fire Underwriters as shown in their Pamphlet No. 58 which covers "The Design, Installation and Construction of Containers and Pertinent Equipment for the Storage and Handling of Liquefied Petroleum Gases," as recommended by the National Fire Protection Association.

Operators unloading tank cars should exercise the precautions listed in *Table 1*.

TABLE 1. SAFETY PRECAUTIONS

1. Don't smoke around the tank car, storage tank or vaporizer house.
2. Locate "Tank Car Connected" sign.
3. Ground the tank car before making connections.
4. Keep automobiles and trucks away since they are a source of fire hazard.
5. Use electrical equipment built and installed in strict accordance with Class 1 Group D requirements of the National Electric Code.
6. Don't attempt to operate a propane or butane system without understanding the purpose of each valve.
7. Open valves slowly to prevent excess flow valves from closing.
8. Test for leaks only with soapy water or linseed oil.
9. Check storage tank to assure sufficient space for contents of tank car.
10. Be sure that all unloading connections are tight.
11. Be sure to relieve pressure in unloading hoses before disconnecting.
12. Don't get liquid propane or butane on your hands or clothes.
13. Be sure not to hold your head over safety valve or gauging device.
14. Keep available proper fire extinguishers. Water should not be used.

Bulk storage tanks and accessories are the most important part of the LP gas system. Care in their design, fabrication, installation and maintenance is important from a safety viewpoint. As a flammable product under pressure is being handled, storage must be designed to eliminate possibility of rupture and leaks. The use of the specifications of the Department of Public Safety in Massachusetts listed as Par. 66 and the codes set up by the ASME for other New England states should be strictly adhered to by companies building these pressure vessels. Liquefied petroleum gas is not a corrosive material; therefore inside corrosion is not a factor. The outside of aboveground tanks should be given the best of maintenance and kept finished with a light-reflecting color.

The use of proper fittings and accessories on storage tanks is of utmost importance. All openings in storage tanks with the exception of safety valve and gauging device openings should be equipped with excess flow check valves which prevent excessive flow in the event of pipe or valve failure. These should be placed immediately inside the tank opening. Tanks should be provided with a suitable gauging device for determining liquid contents, with safety valves and a thermometer well. Tank safety valves should have risers extending 10 ft. above the tank and discharging vertically upward without return bends or other obstructions that might deflect the gases back onto the tank. Liquid lines should have hydrostatic relief valves and where lines are of considerable length, added protection will result from the installation of excess flow valves. On large installations, it may be necessary to use two or more excess flow valves in parallel to handle the required capacity.

PROPANE and butane are stored in liquid form; therefore, it is necessary that they be converted into a vapor phase before distribution either in a diluted or undiluted form. This vaporization is carried on by either of two methods: (1) by application of atmospheric heat to the bulk storage tank and subsequent withdrawal of the vapor from the space above the liquid, or (2) by the application of artificial heat through the use of some type of heat exchanger. Because of the low boiling point of propane, it is estimated that a tank storing propane will vaporize one and one-half times its liquid capacity each month by absorption of atmospheric heat. When butane or mixtures of propane and butane are used, it is recommended that vaporization be accomplished by the application of artificial heat. This is also the case where it is necessary to use a large quantity of propane in a short period of time. Artificial vaporization is usually accomplished by use of hot water or steam in a heat exchanger. The latent heat of vaporization for propane is 785 Btu per gal. at its boiling point, and 808 Btu for butane. Vaporizers should be installed in a special building provided expressly for that purpose and should be separated from the main buildings by a vapor-proof non-combustible wall.

The hot water heater or steam boiler should never be installed in the same room. A safety relief valve should be installed on all vaporizers. Also, it is very important that provision be made to prevent liquid from leaving the outlet of the heat exchanger.

In using propane and butane vapors, it is necessary to give careful consideration to dew point of the product being used so as to prevent the hazard which may result from condensation or reliquefication of the product. At 0°F propane vapor would liquefy at pressures over 24 psi. Butane vapor must be over 35°F for as low as 2 psi vapor pressure. At 0°F propane-air of 800 Btu can be used at pressures up to 110 psi and butane-air at the same Btu and temperature can be used at pressures up to 18 psi.

Because of the uniformity of propane and butane, which are generally diluted from their original high Btu value—2520 for propane and 3200 for butane—to a lower Btu value ranging from 500 to 1000 Btu by mixing with air (which also has a relative consistency) little difficulty is experienced in the maintenance of a uniform gas. This uniformity is not only true for the Btu, but also the specific gravity, flame speed and combustion limits. To the average plant acquainted with the distribution of manufactured gas, this is quite an innovation and is one of the principal reasons for the substantial decrease in the customer complaint calls when distributing LP-gas-air mixtures. The mixing of the correct proportions of propane or butane vapor can be accomplished by a very simple or a very complex system depending on choice. Proportioning can be accomplished by use of fixed orifices, venturi type of inspirator, or by use of the more complicated systems such as Cutler Hammer-Askania, Selas Valve, Kemp Valve and McKee Diluter. Diluting equipment using atmospheric air for dilution must be provided with a positive means of preventing the back flow of gaseous vapor out through the air intake when the diluting unit is not in operation. Several accidents have resulted from failure of these shut-offs.

In any plant using or contemplating the use of propane or butane, the operators should become thoroughly acquainted with the five characterstics in which these products differ from the gases with which they are most familiar. Safety programs should be set up and revised periodically to train personnel with the inherent characteristics of these products as well as the proper operation of the equipment used in connection with these products.

Denver Utility Proves Advantages Of Its Service, Wins New Franchise

A smart piece of public relations work helped win a new 20-year franchise for the Public Service Co. of Colorado, when Denver voters went to the polls Feb. 11. The results: 8½ to 1 in favor of the franchise.

One of the strongest pillars in the campaign was a special issue of the bill stuffer, "Home and Community Service," a monthly booklet published by the company. This issue, accompanying January bills, was devoted to "Benefits and Features of the New Denver Franchise," presenting in eight pages a strong argument for a "yes" vote.

Six planks were stressed in the campaign:

1. Adequate natural gas supply—"second pipe line to be built."
2. Electric rates reduced by more than $1,250,000.
3. Increased franchise tax—payment to the city estimated in excess of $9 million during term of franchise.
4. $1 million street lighting campaign.
5. Any saving from Colorado-Big Thompson project to be passed on to consumers.
6. Adequate gas and electric service for a greater Denver.

Then, accompanying the map reproduced here, an explanation of plank No. 1 was given. The present pipe line, it was pointed out, has reached the limit of its capacity—83 MMcf per day sendout; a new line, for which Public Service had signed a 20-year contract with Colorado Interstate Gas Co., would be built from either Hugoton or Amarillo field, and would be completed in time to meet Denver's heating requirements next winter. Furthermore, ultimate delivery of 215 MMcf would assure ample supply.

An increased tax rate which would provide the city over six times as much revenue as under the old franchise was graphically shown.

Finally, a graph proved that the cost of gas and electrical service was defying the cost-of-living spiral.

7 Million Turn to Gas Cooking in 12 Years

Five years of wartime restrictions failed to halt the trend toward gas cooking, the Gas Appliance Manufacturers Association has reported.

To back up this claim, GAMA presented figures which show:

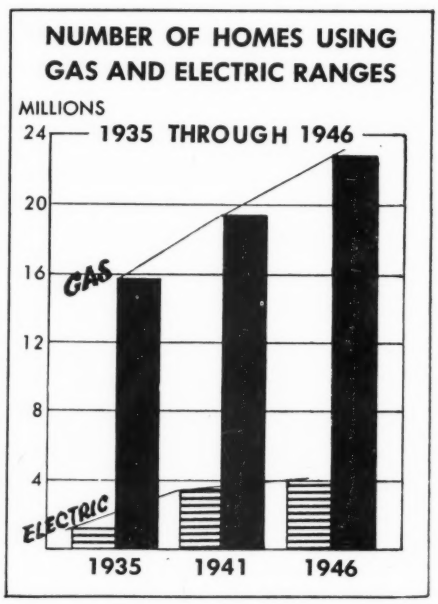
7.1 million new cooking customers were added from 1935 to 1947.

22.9 million homes now cook with gas, as compared to 15,752,000 is 1935.

Net increase: 45%.

For the competition, 2.8 million electric range users were gained in the same period. Total now stands at 4 million.

Other facts worth noting: Over 90% of all homes on piped gas lines use gas for cooking, and 62% of all homes in the U. S. cook with either piped or bottled gas. Rural bottled gas customers now total 3.5 million, 600% more than existed in 1935. Total electric range installations in rural territories: 1,785,000.



What About HOUSE HEATING?

The development of a large consumer demand can bring about political pressure that will force gas companies to take this load whether it is considered desirable or not. Therefore, steps must be taken to insure that the heating load is economically sound. To protect capital investment, upgrading is necessary.

By RAYMOND LITTLE
General Sales Manager
Equitable Gas Co., Pittsburgh

A SHORT time ago utility executives and gas equipment manufacturers were vitally concerned with the development of plans that would assure the gas industry a fair share of postwar fuel business. This planning was commonly referred to as postwar planning and without a doubt there reposes in the files of many companies a postwar sales promotion plan bound with an attractive imitation leather cover and probably inscribed with gold lettering. Typed on the 50 or 100 or more pages of these reports are all the predictions of economic problems to be coped with when the war ended, supplemented with numerous curves and charts. Of course, to make the report complete, plans were formulated to prevent losses in revenue by starting an aggressive sales promotion activity as soon as possible after the war ended.

You will recall the main objectives of practically all such plans were to meet electric competition, in order to maintain the utilization of gas for cooking and water heating, and to gain new base load revenues from refrigeration. Industrial and commercial revenues, in spite of the discontinuance of heavy wartime production, were to be kept at high levels by broadening the use of gas as a fuel. Residential base load, as well as commercial and industrial load, are highly essential to a well balanced operation of nearly every gas company, but even if income from these sources dropped considerably solace was taken in the fact that gas house heating presented a great opportunity for increased business.

At the present time most of us can return to our files, search out the house heating predictions section of The Postwar Plan, and reverently place a sticker on it inscribed with the capital letters R.I.P. Before postwar sales plans could be started gas companies all over the land were deluged with consumer demands for gas heating and, in less than a year after the war ended, it was necessary for many companies to declare a holiday on the installations of heating equipment, especially conversion burners. Thus, rather than develop a market for gas it became necessary for gas utilities to seek increased supplies of gas to satisfy growing consumer demands.

IN December 1945, the A.G.A. House Heating and Air Conditioning Committee met for the first time since the start of United States participation in World War II. Even at this early date there had developed a considerable trend toward gas fuel for house and building heating. Today we know this trend continued to the embarrassment of numerous companies. Taking full cognizance of the situation, the committee dropped all ideas for the promotion of house heating equipment and decided on a program designed to place emphasis on better quality equipment and installations. The first committee report was issued to the industry in September 1946, and was titled "What About Gas House Heating." The distribution of the report was somewhat limited and it will hardly be amiss to present it at this time as a part of this paper.

In the foreword of the report it states:

"It is the purpose of the House Heating and Air Conditioning Committee to focus attention on the necessity for upgrading gas house heating through the sale of quality gas heating equipment and its proper installation. . . .

"In view of the expressed interest of the gas industry relative to a program for gas heating similar to the "CP" gas range program, which was so effective, the committees have for the past several years concentrated efforts towards the development of a "CP" program for gas house heating equipment and its installation.

"Even though "CP" requirements for forced warm air heating have been successfully completed, the committee believes that in view of the tremendous increase in demands for gas house heating and various local conditions, a program is required that can be started at once. Further development of the "CP" program would require considerable time, preventing its effectiveness in the current situation. Experience in the future will determine the desirability of continued development or completion of the "CP" heating program.

"Your committee has carefully analyzed the current situation in the gas heating field, particularly from the viewpoint of consumer demand and increased dealer sales of gas heating equipment. These factors which must be faced by our industry make it of vital importance that we act now to protect our future business.

"This report is devoted to a summary of the committee's observations on the subject of Gas House Heating."

Continuing, the body of the report starts with the question—

"What about gas house heating and the future of the gas industry from a revenue and sound financial standpoint?" This question is one that must receive serious study from

Presented at A.G.A. Eastern Natural Gas Sales Conference, Pittsburgh, Pa., Feb. 13-14.

gas company management all over this land. For years cooking and water heating, and of more recent years, refrigeration, have been considered the base load of the industry in the residential field. Recent developments in electric competition are a constant threat to these sources of revenue and new residential revenues to maintain annual gross income can come from only one major source and that is gas heating. In the not too distant future gas companies will no doubt consider house heating also as a part of the base load.

Numerous studies have been made by qualified individuals or groups on the economics of the gas house heating load. Some studies have dealt with load factors, pointing out among other things the undesirable peak load characteristics of house heating business. Other studies have treated the broad subject of the economics of gas house heating from a capital investment and revenue standpoint, with conclusions that conflict as to the merit of house heating business. All of these studies have value in respect to fixing rates and determining individual gas company policies as to sales promotion, servicing and generally making provision to handle the house heating business. However, regardless of the merits or demerits of house heating business as developed from such studies, the question still remains as to what the gas industry is going to do about the current tremendous demand for gas as a heating fuel. It is doubtful whether the industry can afford to refuse the business in view of strong competition for the cooking, refrigeration and water heating revenues on the one hand and the public and political relations on the other.

Demand May Force Action

The development of a large consumer demand can bring about political pressure that will almost if not actually force gas companies to take this load whether it is considered desirable or not. Therefore, it seems wise for the gas industry to start action now in the interest of developing a heating load that is sound economically.

Previous to and since the close of the war numerous surveys were made in an effort to determine market potentials for all kinds of consumer goods and also to determine consumer preferences. Many of these surveys included as one item heating fuel preference especially among those who planned to build or buy a new home. The results show that from 40% to 65% of the people desire to use gas. Estimates for new homes to be built in the United States in the next decade range from 4 million to 7 million. Taking the minimum figures, this means 1.6 million gas heating customers from new building alone. A trend to gas in the new home field cannot help developing a similar trend in the existing home market, and one can safely say that in the next ten years from 3.5 million to 5 million homes will want gas for heating.

Capital Required

Departing from potential markets indicated from surveys, let us look at current customer demands. Without new building getting very far underway, Chicago, Detroit, Pittsburgh, and East Coast and West Coast cities are actually selling gas heating at a rate three to five times greater than in any pre-war year without keeping up to customer demands. In fact sales have been stopped in some cities and localities because either equipment or gas or both are not available to fulfill demands.

The question can properly be raised as to the temporary nature of this increase in house heating business. Undoubtedly the free circulation of money in the country is a factor, plus a five-year pent-up demand due to war restrictions, but of more importance to the long range outlook is the increase in coal and oil prices ensuing from increased operating costs in these industries. Also in many instances local conditions such as enforcement of smoke ordinances have a bearing on the situation.

Under present schedules of production of straight gas-fired boilers and furnaces, the house heating installations being made today are largely conversion burners . . . When straight gas-fired equipment is again readily available, many of these burners will be discontinued and thus gas companies will find their lines loaded with orphans for which the customers will be unable to obtain parts or replacements.

Of even more importance, consideration should be given to who is selling and installing these burners. In most localities it is the dealer or heating trade and in many cases their experience and knowledge in the use of the burner is so limited that it gives rise to concern as to the type of installations that are being made as to safety, sizing and proper performance. . . .

Continued growth of the house heating load will require the building of greater gas generating capacities or the drilling of more wells. Transportation and distribution systems will need to be increased in capacity and new meter sets will be necessary in many cases. These capital expenditures will be augmented by operating cost associated with increased accounting, customer inquiries and complaints, and increased appliance servicing where it is now available to customers. No gas company relishes increases in operating cost and capital investments unless a return is assured. Usually the return is predicated on a firm demand for gas over a period of years, and it is therefore of paramount importance for the gas company locally and the industry nationally to exercise as much control as possible over the type of heating load being placed on the lines. In this way only is the gas company assured of firm business from satisfied customers and a resultant return on investments.

Signal for Action

Over the years the gas industry has expended hundreds of thousands of dollars to develop customer acceptance of gas for house heating. . . . The best evidence of this is the fact that demands for gas heating are greater than ever. This indicates consumer confidence and satisfaction and if we are to continue to deserve this confidence continued leadership must be maintained. In this way we can continue to hold the standards of gas heating high and assure the industry revenues that are continuing and profitable. Any other course will make the gas heating load unprofitable, and if we place our interest entirely in the hands of inept dealers you can rest assured the experience will be sad and the cost tremendous.

Clear thinking seems to indicate that the increased consumer acceptance for gas house heating is a signal for immediate action toward the development of an effective program. Your committee will soon recommend to the industry the adoption of a program specifically designed to educate the consumer, the heat-

ing trade, the architect and builder, in respect to the necessity for maintaining high-grade standards for house heating with gas.

The program envisioned by your committee is one that of necessity is to start and be carried out at the local point by the gas industry if it is to be effective. The following is a brief summary of a number of fundamentals which should be undertaken to solve successfully the current and future heating problems.

It is obvious that the gas company must maintain leadership in creating the desire for quality heating equipment and high grade installations. The gas company must develop a realistic dealer sales program and provide dealers with sales and installation training, in addition to making available adequate engineering assistance including data on heat loss calculations, sizing and heating plant layouts.

The service facilities of the gas company should be made available on all heating installations sold by dealers on a basis similar to that of gas company sales. Information on the gas company's policy relative to pricing, terms, and selection of equipment for gas company endorsement, should be made available to the dealer as a means of insuring profitable dealer operations. . . .

The committee will soon issue a report devoted to suggested plans designed to assist gas companies in the development of programs to upgrade house heating installations. Included in this report will be a summary of the methods or plans used by representative gas utility companies that have proved successful in upgrading house heating installations, in addition to a listing of other material which will be available to the industry as a means of achieving this objective.

THAT is the end of the first report, and since its completion the house heating problem has intensified and the need for an upgrading promotion is now almost acute because of the great number of poor installations being placed on the lines of many gas companies in recent months. As promised in the closing paragraph of the first report, considerable work has been done on the second report, which we hope to finish within two or three months.

Some may question the value of any type of industry heating program when so many uncertainties are faced in regard to the gas available to supply additional heating load. In this respect recognition must be given to the tremendous investments existing in gas utility properties, a large part of which were made on the basis that house heating business would provide the necessary revenues to carry them. Then, too, attention must also be given to recent reports pointing to a spectacular growth of the gas industry.

Recognizing the seasonal and peak load characteristics of the heating load, numerous distributing companies will find it advantageous and essential to develop storage capacity. This may be in the form of underground pools or the construction of holders. Through a broader use of storage gas deliveries from pipe lines can be contracted for on a firm daily amount, and by accumulating gas in the off heating months of the year gas companies will be in a position to take on increased heating load. Thus it seems obvious that the industry expansion planned for transmission lines will be augmented by the expansion of the system and facilities of local gas companies.

Departing from current investments and planned expansion of the gas utilities, it is only fair and proper to take recognition of the gas heating equipment manufacturers' stake in the future of gas heating. Investments in manufacturing plant facilities are pretentious and thousands of people are dependent on these plants to earn a living. Before and since the end of the war some manufacturers haxe expanded plant capacities, thus exhibiting confidence in the future of the industry.

Huge investments such as briefly indicated here require new revenues and sales in order that they can be financed and in order that companies can operate on a profitable basis. While gas utilization normally can be increased in all markets by sales promotion, it seems obvious that space heating represents the greatest opportunity to obtain new revenues in a volume commensurate with the large investments in plant expansion now planned and pending for the near future.

Of equal importance in considering the future outlook for gas heating sales, it will be wise to take stock of some major reasons contributing to the current high demands for gas heating. First, limitations placed on heating sales during the war years resulted in building an accumulated demand. Second, under a war economy money flowed freely and people rushed to buy those things they considered most desirable, developing a seller's market. Herein is evidence that gas industry advertising, promotion and salesmanship of the past was quite effective. Third, no one anticipated that John L. Lewis would develop into the best gas house heating salesman in the history of the gas industry. By his action he has raised the price of coal so that the competitive price advantage is practically wiped out.

LET us not fail to recognize that these favorable conditions contributing to the unprecedented demand for gas heating will all pass. In fact they are in the process of passing right now because many signs point to the end of easy money. Thus when we are again competing for our share of the consumer's dollar, it will be necessary to advertise, promote and sell house heating because in a competitive market no industry's product or service will remain long in demand without the support of sales promotion backed by a creditable record of performance.

The current publicity dealing with gas shortages involving the curtailment of industrial customers and the necessity for stopping heating equipment installations is not exactly good sales promotion and cannot help but lower the demand for gas heating. The coal industry will not lose the opportunity to make capital of this misfortune and other forms of competition are already appearing on the horizon in the form of the "Heat Pump" and electric space heating. Who knows, atomic energy may some day be a major competitor. The point is that people demand heating comfort and are willing to pay for it. Thus a great source of revenue is open to the fuel that can be relied upon to do this job, and if gas does not fill the bill then competitive fuels will.

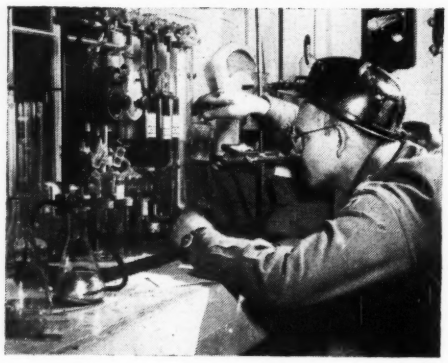
Since a future need for selling gas heating seems inevitable, it becomes even more essential to act now as an industry to place a base or floor, below which we will not go, on the quality of equipment and its installation, in order that house heating revenues can be built with a high degree of permanency, guaranteeing a return on the investments, over a long period, necessary to take on such a load. The House Heating and Air Conditioning Committee will endeavor to develop an acceptable industry upgrading program. Irrespective of the essential features of the program, its success will depend entirely on how effectively it is applied at the local point by the gas companies.

Gasifying Coal Underground

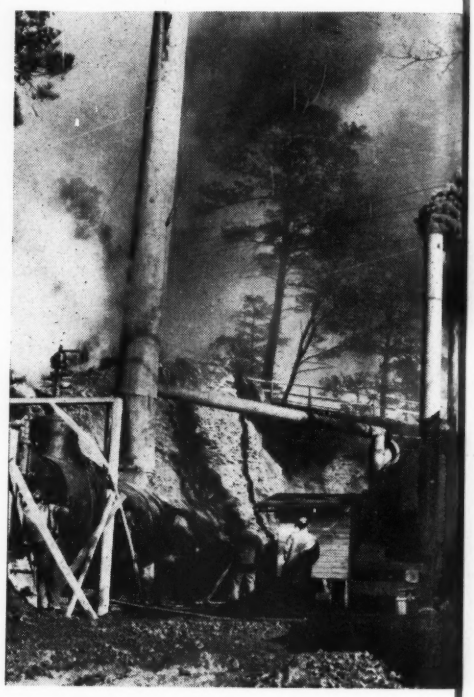
A GAS usable for burning under boilers in industrial plants, and for manufacturing synthetic liquid fuels—including gasoline and lubricating oil—may some day reach the market if experiments now being conducted at the Gorgas mine, near Jasper, Ala., prove economically successful.

The mine is the property of the Alabama Power Co., which began tests in January in an effort to produce gas at the mine for direct piping to the boilers of a nearby plant for use in generating electricity.

Coal miner at Gorgas checks observation pipes. Pressure gauge can be seen on pipes.



Arthur Sands, Bureau of Mines chemist, making laboratory tests of results.



Smoke begins to pour from stack after lighting the fire. Small shed in foreground houses blower.

At left, the west observation cross cuts, showing pipes leading to burned-out area, with Thermal couple wires leading from pipes and pressure valves on top of pipes.

Correction of Baking Complaints

By JOAN HUCK

A.G.A. Testing Laboratories

ONE of the more than 500 requirements that a gas range must meet in order to display the Laboratories Approval Seal is: "The heat distribution in the oven shall be so uniform that plain layer cakes baked at 375°F (±10°F) for 25 to 30 minutes, unless otherwise specified by the manufacturer, will be evenly browned." The method of test for determining whether a range meets this requirement specifies the baking of four cakes simultaneously, using a standard yellow layer cake recipe developed by a subcommittee of the A.G.A. Home Service Committee. The cake pans for this test are No. 22 gauge aluminum, 8 in. in diameter by 1⅛ in. deep, each containing 0.8 lb. of batter. Two pans are placed on the upper rack, one in the left rear and one in the right front corner. On the lower rack one pan is placed in the right rear and one in the left front corner. All four pans are symmetrically located so that the distance between them is equal to the distance of each pan from the nearest side wall.

At the end of the alloted baking time, cakes are removed from the oven and allowed to cool to room temperature. Samples 1 in. square of the lightest and darkest portions of both the top and bottom crusts of each cake are selected for reflectance measurements with a photoelectric reflectometer. This instrument provides an accurate means for measuring color of the cake samples and eliminates discrepancies inherent in judging it by eye. The difference in reflectance between lightest and darkest sections must fall within defined limits in order for the range to pass this test.

The cake baking test is further supplemented by a cooky baking test, in which cookies distributed in the oven on a single cooky sheet must brown evenly in not more than 11 minutes.

Once a range has satisfactorily met the cake and cooky baking tests described, we feel that the oven will satisfactorily bake or roast any type of foodstuff, provided certain precautions —which will be pointed out later—are followed. We have verified this conclusion by baking pies, biscuits, bread, angel food and sponge cakes in ovens which had satisfactorily met American Standard approval requirements for baking layer cakes and cookies. These ovens were found to be flexible enough in operation to produce good quality baked goods of any type. The baking tests specified by the requirements therefore eliminate poor baking characteristics that might otherwise be encountered.

Surveys made on baking complaints indicate that almost 90% of them may be attributed to improper baking methods while the other 10% are due to a defective range or improper burner adjustment. Let us review some of the factors responsible for baking failures even in an approved gas range oven.

In general, baking complaints may be classified as being traceable to the range itself, or to such factors as preparation of batter, pans used, placement of pans, or oven temperature.

WHEN a homemaker experiences a baking failure, it is only natural that her first reaction is to blame it on the oven. The home service representative, of course, is sure that she is to blame, in view of the fact that the high percentage of baking complaints are found to be the housewife's fault. However, there is a chance that the oven may be at fault. For example, occasionally inspection may show that the kitchen floor slopes sufficiently to throw the range off level. Tests conducted at the laboratories to simulate such conditions indicate that tilting the range by elevating one side does not change the evenness of browning except in extreme off-level positions. Tilting from front to back or vice versa, however, does upset heat distribution to a degree sufficient to warrant extra care to ensure that ranges are always installed level. Then, too, off-level positions will produce cakes which are thicker on one side than on the other, a condition which is perhaps even more unsatisfactory than uneven browning. A warped oven rack will also cause cakes to bake unevenly, and may be a contributing factor to uneven browning in the same manner as if the range were not level.

Some home service girls report they have noted that the primary air adjustment of the burner has an effect on distribution of heat in the oven. It is the general opinion that a lazy soft flame will cause faster baking and browning on the lower rack than on the upper rack. Conversely, if the flame is adjusted with too much primary air, the top rack will brown faster than the lower rack.

Tests conducted at the laboratories indicate that a change in the primary air definitely disturbs the normal heat distribution in the oven, but in a rather unpredictable manner from the standpoint of degree and uniformity of surface browning of cakes. With respect to the opinion that a soft flame adjustment causes fast browning on the lower rack, it would appear that this is a characteristic of the particular range under test. With any range, however, this observation might be noted if the flame were impinging on the oven bottom as a result of its poor aeration.

As ranges grow older in service some warping or mechanical misalignment of the doors which may permit an increase or decrease in loss of flue products around their edges is possible. The laboratories found that oven heat distribution is materially affected by any leakage causing even relatively small changes in flue gas travel, although no discernible trend in browning could be established. Relatively minor defects in construction causing slight differences in oven door fit might therefore seriously alter heat distribution in various ranges of the same model and construction.

A question the home service girl may be called upon to answer is whether or not polished chromium walls affect browning of cakes. In order to obtain data on this point, cakes were baked in an oven having polished chromium walls and compared with cakes baked in the same oven when the polished walls were coated with lamp black. There was no difference in color between the 2 sets of cakes.

HAVING assured herself that the range is not at fault, the home service girl will start thinking of several

Presented at A.G.A. Home Service Workshop, Cincinnati, Ohio, Jan. 20-23.

things that the housewife herself might be doing wrongly.

Maybe she isn't preparing the batter correctly. As you know, many baking failures can be traced to unreliable recipes, poor selection of ingredients, inaccurate measurements, or improper mixing techniques. Home economics graduates are thoroughly familiar with the effect of these factors on baking results, and therefore they need not be discussed here. I would like to mention, however, a booklet prepared by the Home Service Department of General Mills, Inc., titled "A Source Book on Cake Making," which covers them in detail.

The kind of pans used in baking definitely makes a difference in final results obtained by housewives. If not taken into consideration, the type of pan selected quite often may be the cause of baking failures. Foods in dark tin pans and glass or enamel pans bake faster than in bright shiny aluminum pans, and therefore some adjustment in oven temperature must be made to compensate for difference in heat absorbing properties of these materials. One gas company home service department suggests reducing the oven temperature 25°F. when baking in glass or enamel pans. The laboratories have never conducted tests to determine what temperature should be used to brown cakes to the same degree in the same length of time, employing pans of different materials. However, an oven temperature of 380°F. was necessary in roasting beef in a silver plated glass baking dish to the same internal temperature as an identical roast in a plain glass baking dish at a 300°F. oven setting.

In selecting pans for a given recipe, size should be considered as well as material. Too little batter in the pan causes the top of a cake to be light in color. Too much batter results in overflow and burned edges.

Several of the home service girls who offered assistance in preparing this paper suggested that I call attention to the fact that the modern oven is generally somewhat smaller than that of an older type range. Some consideration must therefore be given to the relationship of size of pan to size of oven, particularly in the selection of cooky sheets. Many housewives continue to use the large cooky sheet which always worked before, and find that in their new oven, the cookies just do not brown on top. "It must be the oven then—," that is, until it is tactfully explained that cookies should be baked on flat sheets of such a size as to allow at least 1 in. clearance on each side in order to provide good circulation of heat.

Standard test procedure for measuring heat distribution in the oven, as I previously pointed out, requires that four cakes be baked when located in certain specified positions. The laboratories felt that it would be of general interest to determine the effect of changes in positions of cakes in the oven, as well as the effect of baking less than the standard number of cakes.

Results showed that baking pans must not touch each other, nor should they touch the sides of the oven. Laboratories' tests data indicate, moreover, that even moving the four layer cakes from the normal 1-in. distance from the side walls to ½ in. caused heat distribution to change in such a manner that the bottom crusts of the cakes on the lower rack were considerably darker in color. Generally speaking, cakes were more uniform in color when placed nearer to the center of the oven than when located in the normal position or at a less than normal distance from the oven side walls. Likewise, more uniform heat distribution was observed when baking two or three cakes than when the standard number of four was baked.

ONE question which seems to concern many home service persons is the effect of a preheating period versus a cold start when baking cakes. It was found that with a cold start, a period of 30 min. would produce cakes almost identical in color and texture to those baked in the normal manner for 27½ min. In general, those baked from a cold start were 2.4% lighter on the top and 1.7% darker on the bottom surfaces than those baked in a preheated oven. This difference is hardly apparent to the eye and can only be detected by means of the photoelectric reflectometer.

An incorrect choice of oven temperature for the product to be baked, or an inaccurately calibrated thermostat, will very likely cause a baking failure. Baking failures which are due to too high or too low oven temperatures are easily recognized from a description of the product. If the temperature is too hot, the cake browns quickly on top and the crust forms before full volume is attained. Consequently, the cake is heavy and compact in texture. The top crust will be overly browned and will be cracked. On the other hand, if the oven temperature is too low, the cake texture is likely to be coarse with a soggy layer at the bottom. The top surface will be sticky and pitted.

The Home Service Department of General Mills, Inc., calls particular attention to the need for accurate baking temperatures with the new method cakes, especially where the batters are thin. When the batter is thin and the temperature is not accurate (particularly not high enough), many of the ingredients tend to settle to the bottom of the cake. Failure thus results.

Occasionally one may receive a complaint that the bottom crusts of cakes baked in aluminum pans are too light in comparison to the top crusts although the correct oven temperature is used. Laboratories' tests have indicated that it is possible to decrease this difference in color between the top and bottom crusts of cakes by prolonging the baking period for a few minutes. This is for the reason that after approximately 20 minutes in the oven using aluminum pans, the bottom crust of standard layer cakes tends to brown more rapidly than the top crust.

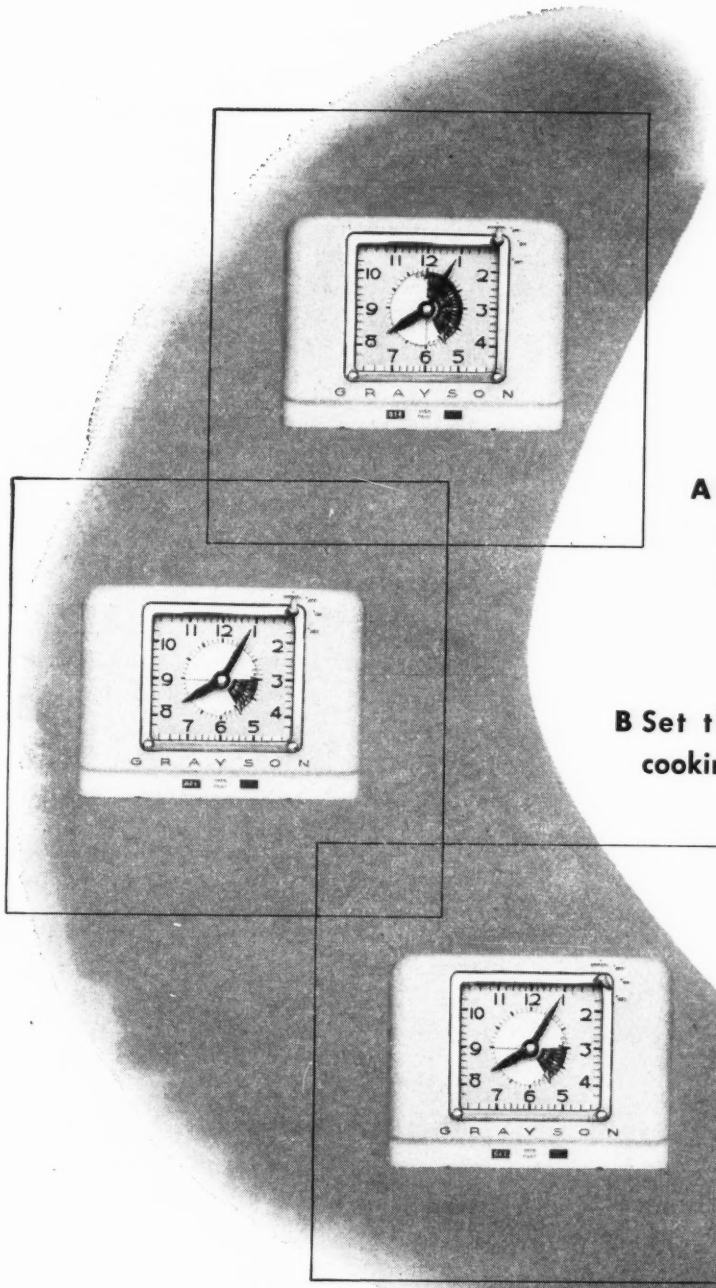
Once the home service department has received a complaint call from a customer who has not obtained satisfactory baking results, what procedure should be followed in handling it? In view of the fact that most complaints are due to faulty methods of the housewife, the plan of the Southern California Gas Co. in handling such calls seems to be a logical and intelligent approach to the problem:

1. A standardized cake recipe is used and all materials are provided by home service, and taken to the woman's home where the cake is made and baked.
2. Standardized pans and other equipment which have been made into a kit are also taken.
3. An appointment is made so that a serviceman either accompanies the home service representative, or a thorough check of the range is made immediately preceding the baking job.
4. One-half of each of the two layers of cake is returned by the home service representative to the supervisor.
5. A report is made either that customer is satisfied or that a recommendation should be made to the service department or to the manufacturer.

Occasionally when the housewife is not satisfied with baking results on standard cakes the particular product causing the complaint is baked.

The Home Service Department of the Ohio Fuel Gas Co. follows a similar plan in dealing with complaints. They have found it time-saving, however, to have the service man check the range in advance of the home service representative's call. Both of these companies report that the number of complaints which they have not been able to solve by these methods has been negligible.

easy to operate



GRAYSON
AUTOMATIC
COOKING
CLOCK

A Set the time for cooking to be completed.

B Set the time for cooking to start.

C Turn the knob to "Set" position.

GRAYSON CONTROLS

DIVISION ROBERTSHAW THERMOSTAT CO.

LYNWOOD, CALIFORNIA

ASSOCIATIONS

A.G.A. Salesmen Meet at Boston

IN an annual A.G.A. sales conference, lightly attended but with enthusiasm for the subject at hand undampened, approximately 185 industrial and commercial gas salesmen, company officials and executives met with manufacturers and designers of gas-fired equipment at the Copley-Plaza Hotel, Boston, March 17-19. Karl Emmerling, chairman of the Industrial and Commercial Gas Section, presided at two of the six sessions; Leon Ourusoff, section vice-chairman, wielded the gavel at two others. Charles C. Eeles, chairman of the Committee on Heat Treating and Finishing with Gas, and W. Wirt Young, heading the Non-Ferrous Metals Committee, were in charge of two specialized sessions devoted to discussions falling within their respective fields of interest.

Of the 25 papers presented before the conference, the majority were technical in nature, devoted to practical details and operating data on methods, equipment and procedures incident to selling industrial and commercial gas. Others touched on some of the broader aspects of gas industry advancement through activities current in research, promotion and advertising.

The accelerated activity of the A.G.A. as the industry's front organization for the promotion of specialized uses for gas was the theme of talks by both Association President R. H. Hargrove and John J. Bourke, director of gas cooking promotion. Bourke, in undertaking a new job with the organization, has devoted a major share of his attention to the presentation of gas messages to trade groups and associations in the commercial cooking field. One promotion project now under consideration is the building of a lecture demonstration, to be made available for delivery before audiences of cooks, bakers, hotel and restaurant operators, and others engaged in volume cooking. A competent chef, experienced in demonstration work, will be engaged to handle the lectures, and the cost of the promotion will be assumed by the utility in any city where the show is booked for presentation. An educational film on commercial gas cooking is another feature under consideration. The speaker stressed the fact that promotion of commercial gas cooking at the local level is of greater importance than national promotion, viewing it as a responsibility to be shared by every gas utility interested in holding this type of load.

Industry-wide cooperation was the theme of a paper prepared and presented by Frank H. Adams, president of the Surface Combustion Corp., Toledo, Ohio. Many of the technological problems that slowed industrial gas promotion 20 years ago have now been overcome, he pointed out; gas developments having outdistanced those made in competitive fuel fields. Other factors favorable to the gas industry were also cited: market acceptance for the fuel, improved economic conditions, recognition by consumers of the shortcomings of non-gaseous fuels, and a general improvement in old and development of new equipment.

Turning to the unfavorable side of the gas industry prospect as it exists today, Adams listed: first, an oversold demand beyond the capacity to produce; second, the danger of lagging utility interest in further commercial and industrial load building as a result of inability to increase gas making facilities; third, the problem of appraising the quantity and economic stability of this load at rates necessary to justify plant expansion; fourth, the attractiveness of gas properties as an investment to get new capital for expansion purposes; and finally, the danger of market neglect during the balance of 1947 as a result of enforced limitation on sales activities.

Challenge Confidence

All of these threats, said Adams, constitute a challenge to the industry's confidence in itself. The gas utilities "should accept the full responsibility of providing gas service to meet the demands of the market which rightfully belongs to it." This means accepting a higher house heating saturation than has been considered in most cities. It means developing an economic balance between industrial and commercial off-peak load to balance house heating as far as possible. It may mean lower overall load factors and higher rates. In closing he urged his audience to "keep customers sold on gas, even though you cannot make an increased supply of gas immediately available. The manufacturers' cooperation in this program follows the lines already requested and planned equipment, technical information, advertising and continued research."

Outstanding presentations dealing specifically with many technical phases of commercial gas included: "Commercial Kitchen Planning," by Milford W. Wall, of S. Blickman, Inc., Boston; "Selecting Commercial Cooking Equipment," by Clarence E. Hebert, Lynn Gas and Electric Co., Lynn, Mass., and Harry O. King of Standard Gas Equipment Corp., Boston; "Selling Gas to Bakeries," by K. Camille Den Dooven of H. A. Johnson Co., Boston, and "Sanitation in the Restaurant," by H. A. Nordquist.

Representatives from industries more interested in gas utilization than in the problems involved in selling it included William E. Broeg, Boston food consultant; Paul P. Logan, National Restaurant Association, Chicago; and Ernest Henderson, president of the Sheraton Hotels, Boston. A block of papers falling under the general heading of remarks for the good of the industry were authored by E. S. Pettyjohn, director of the Institute of Gas Technology, Chicago; F. B. Jones of the Equitable Gas Co., Pittsburgh, and E. H. Aacker, Boston Consolidated Gas Co. The latter analyzed the position of "Gas vs. Competitive Fuels under Changed Economic Conditions."

Papers in the strictly industrial field of utilization, dealt with the use of gas in metal working industries, in ceramics, in finishing process and numerous other applications.

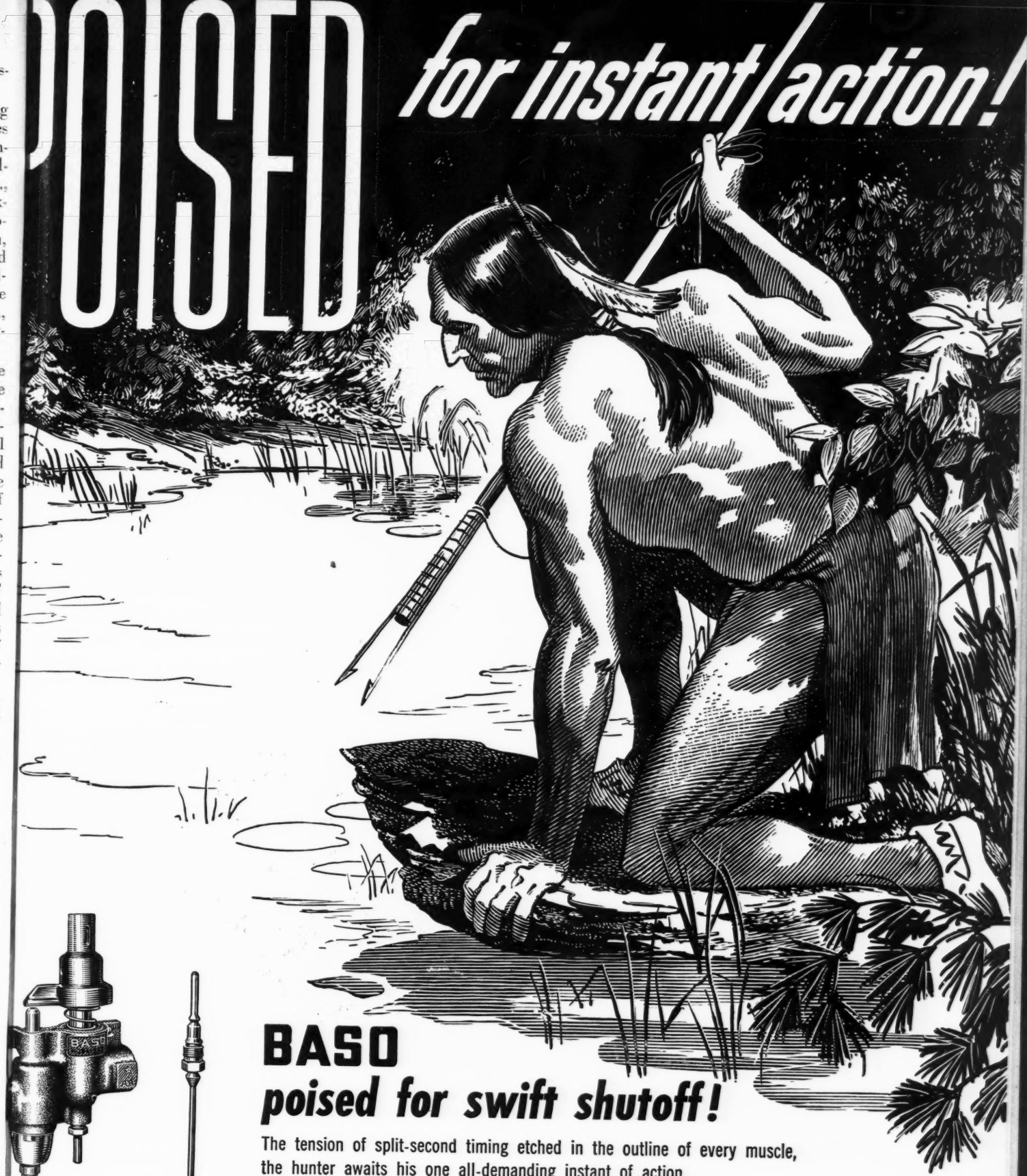
Despite predictions and prognostications that have been released in recent months on the threat of atomic energy to render obsolete every other source of power, Dean George R. Harrison, of the Science Department, Massachusetts Institute of Technology, prophesied that all of the older forms of light heat and power have many years of useful service ahead of them. As an expert on nuclear fission, the dean for a moment made that extremely complex and baffling study appear understandable to industrial and commercial gas men.

Cleveland To Be Scene Of Joint Conference

HOTEL Cleveland, Cleveland, Ohio, will play host to the annual conference of the A.G.A. Distribution and Motor Vehicle Committees, beginning April 14. Two general sessions, round table conferences, and special conferences on current problems will highlight the three-day event.

Following welcome speeches by J. H. Collins, Distribution Committee

POISED for instant action!



A. G. A. APPROVED

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BASO
poised for swift shutoff!

The tension of split-second timing etched in the outline of every muscle, the hunter awaits his one all-demanding instant of action. So BASO, steel-muscled and finely balanced, stands expectant guard against pilot flame failure. At the moment of need, swift, positive action snaps the BASO valve shut, prevents escape of unburned gas. Pressure on the reset button seals off the main burner and opens the pilot for safe, simple relighting.

FOR RELIABLE, AUTOMATIC GAS SHUTOFF...SPECIFY

BASO...The Automatic Pilot

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MILWAUKEE GAS SPECIALTY COMPANY • MILWAUKEE 1, WISCONSIN

chairman; J. French Robinson, president, The East Ohio Gas Co.; and Hudson W. Reed, president, The Philadelphia Gas Works Co. and A.G.A. 1st vice-president, at the general session Monday morning, H. Carl Wolf, A.G.A. managing director, will discuss "The Future of the Gas Industry and the Distribution Man's Part in This Future." "The Approach to Driver Education" and "Job Specifications and Evaluation—Why and How" are the topics to be covered by W. F. Brown, Consolidated Edison, and James A. Whelpley, Cincinnati Gas and Electric, respectively.

Guests will have a choice of attending any of four Monday luncheon conferences under the headings Meters and Metering, Motor Vehicle, Pipe Coating and Corrosion, and Appliance Developments Since the War.

On Tuesday discussions will center around three subjects, to be considered in all-day conferences. They will be on: construction and maintenance jointly with distribution design and development, and pressure control; motor vehicle problems; and work on consumers' premises. C. S. Goldsmith, chairman, Technical Section, and T. J. Perry, subcommittee chairman, will present a brief review of "Conserving Gas Supply During Emergencies" immediately following luncheon.

Featured speaker at the Wednesday morning general session will be E. L. Henderson, United Gas Corp., Houston, whose topic is "Installation and Maintenance of Service Piping."

The meeting will wind up with the Distribution Conference session at which committee chairmen will make their reports, followed by an open forum.

Two Gas Schools

Industrial and commercial gas men are going back to school next month.

A five-day seminar, with lectures by leading authorities embracing nearly two dozen topics, will be presented at the Seneca Hotel, Columbus, Ohio, May 5 to 9, for industrial men. Sponsored by the Industrial and Commercial Gas Section, in cooperation with a group of lecturers which will include members of the Ohio State University faculty, the school will offer for $25 tuition a complete course designed to provide the "know-how" which, together with "the right equipment," will provide more gas sales.

Lectures will cover the various phases of combustion, furnace design, and new developments and specialized equipment.

The school is open to men in utilities, and to manufacturers' employees as well.

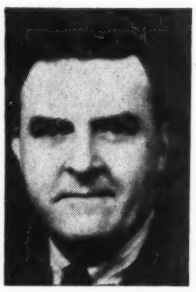
The following week, May 12-16, commercial salesmen, gas equipment manufacturers, and equipment dealers will gather at the Washington Gas Light Co. and the Lewis Hotel Training School, Washington, D. C., for their course. This seminar, which also costs $25, and is sponsored by the Industrial and Commercial Gas Section, will consider principally gas cooking equipment. Other subjects will include terminology, kitchen planning, ventilation, modernization, competition, installation, and many other aspects of the commercial man's problems.

Nash Appointed

George M. Nash, utilization engineer of the Central Hudson Gas & Electric Corp., Poughkeepsie, N. Y., has been appointed chairman of the Subcommittee on Approval Requirements for Incinerators by C. H. Waring, chairman of the Approval Requirements Committee. He succeeds Henry Behrman of the Brooklyn Union Gas Co., who resigned because of ill health.

Other members of the committee are W. W. Baughman of Ohio Fuel Gas Co., Guy Corfield of Southern California Gas Co., Leland Bannister of Valley Welding and Boiler Co., E. O. Howle of Condensation Engineering Corp., and M. A. Naulin of Boweer.

Ginna Named



R. E. Ginna

Robert E. Ginna, vice president in charge of sales of the Rochester Gas & Electric Corp., has been elected to the Committee on National Advertising, succeeding Herman Russell. He will represent companies contributing to the national advertising program situated in New York State, outside Metropolitan New York.

Correspondents Sought

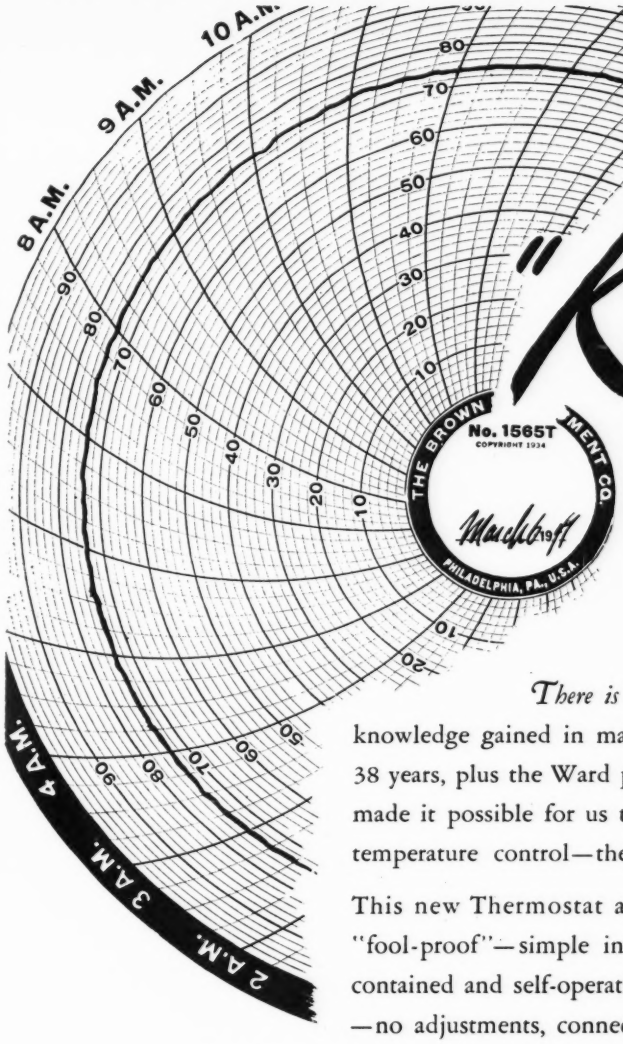
The A.G.A.'s Publicity Bureau is on the lookout for potential newshawks, director George McDonald has announced. To be recruited from member companies, the correspondents will receive releases from the bureau which might lend themselves to local distribution either in original form or with revision slanted toward the locale; and will forward to A.G.A. copies of local news releases which might be combined with those of other companies to give a national story on expansions, improvements, and other subjects.

Gas At Home Builders' Show

The certification program of the New Freedom Gas Kitchen Bureau was the theme of the A.G.A. exhibit at the National Association of Home Builders' exposition in the Stevens Hotel, Chicago, in late February. Twenty thousand New Freedom layouts and architects' plans were distributed upon request to visitors.

Features of the booth were a seven-page mechanical book, four color film reproductions, and eight miniature model kitchens.

Shown in the photo are C. E. Hall, assistant promotional director; Florence Woodward, Rochester Gas & Electric Corp.; Mary Huck, The Ohio Fuel Gas Co.; and Norval Jennings, assistant director of the kitchen program.



"Know How"

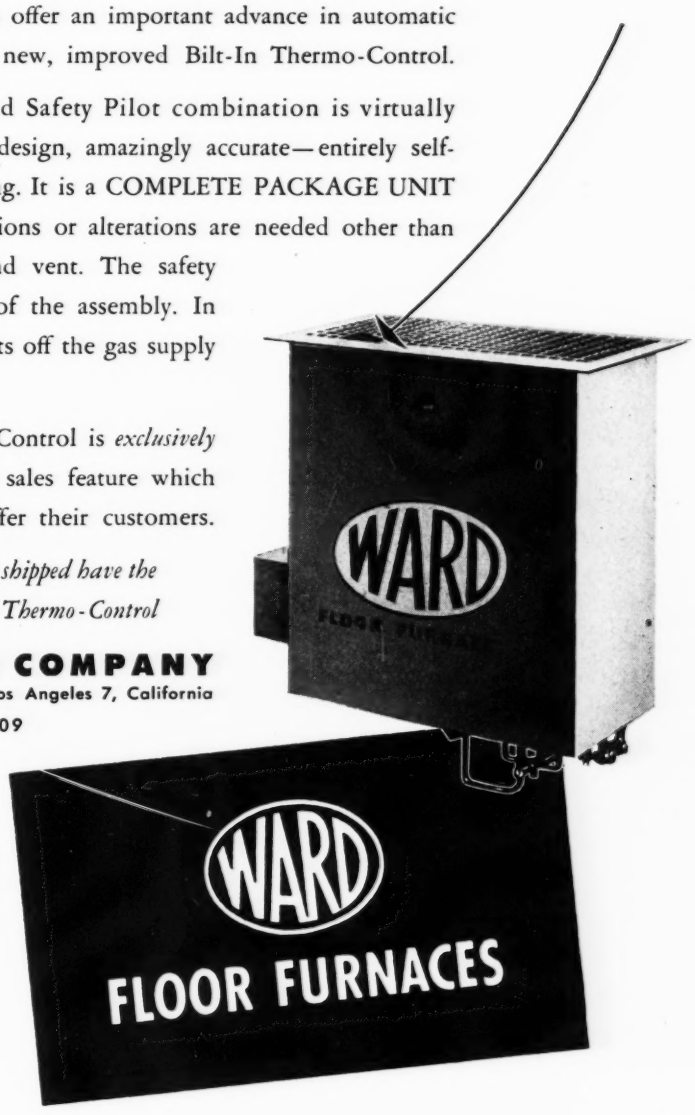
PAYS OFF AGAIN IN WARD'S *NEW, IMPROVED* BILT-IN THERMO-CONTROL

There is no substitute for experience! The accumulated knowledge gained in manufacturing floor furnaces over a period of 38 years, plus the Ward policy of continuous technical research have made it possible for us to offer an important advance in automatic temperature control—the new, improved Bilt-In Thermo-Control.

This new Thermostat and Safety Pilot combination is virtually "fool-proof"—simple in design, amazingly accurate—entirely self-contained and self-operating. It is a COMPLETE PACKAGE UNIT—no adjustments, connections or alterations are needed other than simply connecting gas and vent. The safety pilot is an integral part of the assembly. In event of pilot failure, it cuts off the gas supply to the main burner.

This new Bilt-In Thermo-Control is *exclusively* Ward—another important sales feature which Ward dealers can now offer their customers.

All T-Models now being shipped have the new, improved Bilt-In Thermo-Control



WARD HEATER COMPANY
1800 West Washington Blvd., Los Angeles 7, California
SINCE 1909

A. G. A. reference manual insert sheets containing information and specifications on Ward furnaces are now available. Write us for copies.

LEADING the Southern Gas Association in its convention next month will be: (seated) W. H. Ligon, D. A. Strickland (president), Julia Hunter, W. L. Woodward; (standing) F. L. Carmichall, C. L. Horn, M. H. North, R. M. Hutchison, F. M. McMullen.

SGA To Gather At Biloxi, Miss.

TAKING for its theme "Set Sails for Sales"—a timely keynote sounding the return to active selling of modern gas service—the 36th annual convention of the Southern Gas Association will be held for three days, starting April 16, at the Buena Vista Hotel, Biloxi, Miss. An attendance in excess of 800 is anticipated.

The association has drawn from the top layer of the gas industry for its speakers, and promises one of the most complete and informative programs on record. The nearly 50 speakers lined up for the intensive agenda—excluding discussion group and forum leaders—will include such authorities as Charles I. Francis, Houston lawyer; W. H. Senyard, Louisiana Power and Light Co. personnel director; Clayton Rand, humorist and philosopher; the A.G.A.'s president and managing director, R. H. Hargrove and H. Carl Wolf; A. von Wening, vice president of the A. O. Smith Corp.; Elizabeth Sweeney, household equipment editor of McCall's; John J. Bourke and Charles W. Person of the A.G.A. staff, and others.

Wednesday

The program will get under way with an all-day meeting of the A.G.A. Southwest Personnel Conference, a Home Service Workshop, an Accident Prevention Round Table, an Industrial Sales Round Table, and a Commercial Sales Conference. W. H. Senyard will preside at the personnel meet.

Concurrently, the workshop will get under way at 9:30 under the leadership of Julia Hunter, Lone Star Gas Co., Dallas. The morning portion will present President Dean A. Strickland, followed by five speakers discussing water heating, safety, and merchandising. Following Miss Sweeney's address at luncheon, the workshop will reconvene for a demonstration of "Fourth Zone Cooking," and an address on kitchen parties, with a three-way group discussion winding up the meeting.

With R. M. Hutchison, Houston Natural Gas Corp., and J. F. Scott, Southern Natural, presiding, the all-day round table for accident prevention will consider a dozen topics, including such subjects as small company programs, gas explosions, arc welding, responsibility of supervisors, operating manuals, visual aids, etc.

Industrial and commercial sections will each have a half-day program on Wednesday. R. M. Scoggins, Arkansas-Louisiana Gas Co., will preside over the Industrial Sales Round Table, with an agenda including sales by utilities or dealers, servicing by utilities or service organizations, new industrial uses for gas, competitive fuels, and interruptible gas service rates, standby fuels, and contracts.

In the afternoon, similar topics will be considered from the commercial angle, together with other subjects of interest—such as public relations as it applies to the field, and the trend to counter lunchrooms. L. W. Crump, Oklahoma Natural, will preside.

Thursday

Thursday will see a full slate including the general session in the morning, combined sales and industrial and commercial section luncheon, combined operating and accident prevention sections luncheon, accounting section luncheon, with the afternoon devoted to accounting, sales, and industrial and commercial sessions. Dean Strickland will preside at the general session, which features talks by Wolf and Hargrove.

At the afternoon Sales Conference, F. D. Bradley, Southern Union Gas Co., presiding, the New Freedom Gas Kitchen will be discussed in a five-ply panel discussion.

The operating section, with F. L. Carmichall in the chair, will consider problems of connecting services to mains, high and low pressure distribution systems, and corrosion control.

Talks by O. N. Sellers, Sellers Engineering Co., on "Commercial Water Heating"; Bourke on "The Local Man in the National Picture"; and P. S. Park, A. M. Byers Co., on "Advantages of Radiant Heating," will feature the Industrial and Commercial section meeting, with D. D. Beach, Atlanta Gas Light Co., presiding.

"Cost Per Average Customer," "Consumer Deposits," and "Customer Relations" are the topics chosen for the Accounting Section's meeting, under F. F. McMullen, United Gas Corp.

Friday

Francis, Senyard, and von Wening promise to make the final general session on Friday morning one of the best. Vice President W. L. Woodward will preside.

After the general luncheon, which will feature Clayton Rand, the four sections will reconvene. The Sales Conference Section will hear H. Leigh Whitelaw, GAMA; J. W. Lea, A.G.A. Domestic Range Committee chairman, and John Gilbreath, Servel, and will discuss in panels four phases of merchandising. Carl H. Horne will preside.

The Operating Section will hold three panel discussions.

The Industrial and Commercial Section will feature talks on fuel oil and LP-Gas standby, food processing and fuel, kiln drying of lumber, and industrial development in the South.

Films will highlight the Accounting Section's last meeting.

Appliance Short Course

FINAL dates for the 1947 Short Course in Gas Appliances have been set for May 26, 27 and 28 and the place is Tulsa, Okla., in Kendall Hall, University of Tulsa.

Dr. F. T. Gardner is director of the course. General subjects for presentation, demonstration, and discussion will include: sales and servicing, principles of proper venting, good installation practice, future of the gas industry, combustion characteristics, basic electricity, automatic ranges, air conditioning, servicing commercial appliances, calculating heating requirements, industrial burners, floor furnaces, hot water heaters, space heaters

More women plan to buy Magic Chef than any other Gas Range . . .

and when Mr. and Mrs. America step out to buy . . .

MEET THEM ON THE HIGHWAYS AND IN YOUR LOCAL NEWSPAPER

(This 4-color, 24-sheet, imprinted with your name, is free.) You will like the way we've stressed the dealer angle in the headlines of these newspaper ads.

MEET THEM IN YOUR SHOW WINDOW

A perfect show piece for your window is this fluorescent sign alongside a Magic Chef. When tube is lighted, the red, yellow and white messages stand out against a rich blue background. It's a permanent, prestige-building unit.

MEET THEM INSIDE YOUR STORE . . . WITH THIS PLASTIC FULL-ROUND MAGIC CHEF

28″ high, lifelike in color and form, this cherubic Chef points with a red stick to a sales message on an 8½″ x 11″ card which fits in his left hand. Three cards come with the figure and each has a message which suits your retail needs. A free display card service will keep this unit up-to-date.

For details on these and dozens of other sales helps—contact your Magic Chef Sales Representative, *American Stove Company, New York; Philadelphia; San Francisco; Chicago; Cleveland; Atlanta; St. Louis.*

and ranges, gas refrigeration; and automatic controls, including: thermostats, magnetic valves, relays and limit controls, and diaphragm valve controls.

All registrants who are actually engaged in installation or servicing of appliances will be urged to submit letters on each of these subjects: "What I Learned from the 1947 Gas Appliance Short Course" and "Suggestions for Improving the Gas Appliance Short Course." First prize for the best letter on each subject will be $15. Second prize will be $10. Letters will be judged by a committee appointed by the Southern Gas Association.

In addition to members of the short course advisory committee announced in February GAS, C. C. McEachern, United Gas Corp., is also a member.

Technology Course

A second annual Short Course in Gas Technology will be offered at Texas College of Arts and Industries, Kingsville, May 27-30.

F. Dotterweich

Procedure of the course will be similar to last year's conference, which attracted more than 200 industrialists from 10 states. Facilities of the A & I natural gas laboratory as well as inspection trips to installations near Kingsville, situated in the heart of the coastal plain region, will again be available to the registrants.

Two sections of study have been announced by Dr. Frank H. Dotterweich, head of the A&I engineering department, who is again serving as chairman of the administrative committee.

"Technical Problems in Transmission" is the subject of the first section, which will be headed by R. M. Hutchinson, research director of the Houston Natural Gas Corp. The other will be "Technical Problems of Gas Utilization," arranged by George Elmer May, principal utilization engineer for New Orleans Public Service, Inc.

Instructors will be research experts, industrialists, and A&I faculty members.

Acting once more as sponsor for the course is the Southern Gas Association, whose managing director, Robert R. Suttle, is again a member of the administrative committee.

NACE

Corrosion Conference

Corrosion engineers in the gas industry are joining those of four other industries this month at the 1947 conference and exhibition of the National Association of Corrosion Engineers being held in Chicago, April 7-10. Water, communications, electrical, and oil industries will also be represented at the meeting.

A. N. Horne, Texas Empire Pipe Line Co., Tulsa, Okla., will chairman the Gas Industry Symposium April 9. The program will include "Results Obtained with Pearson's Holiday Detector," presented by A. H. Cramer and W. R. Fraser, Michigan Consolidated Gas Co., Detroit; "Alloying Steels for Corrosion Resistance to Gas Condensate Fluids," by K. Eilerts and Faye O. Greene, Bureau of Mines, Bartlesville, Okla.; "Statistical Analysis of Test Containers for Condensate Corrosion Studies," by V. V. Kendall, National Tube Co.; and "Chimney Liner Corrosion Resulting from Gas Fired Furnaces," by G. B. Johnson, Minneapolis, (Minn.) Gas Light Co.

CALENDAR OF ASSOCIATION ACTIVITIES

April

American Gas Association—Edison Electric Institute Accounting Conference—Hotel Statler, Buffalo, N.Y., April 7-9.

Mid-West Gas Association Annual Meeting and Convention — Hotel Paxton, Omaha, Nebr., April 7-9.

National Association of Corrosion Engineers Annual Convention—Palmer House, Chicago, April 7-10.

American Gas Association Distribution and Motor Vehicle Conference—Hotel Cleveland, Cleveland, Ohio, April 14-16.

Gas Appliance Manufacturers Association Annual Meeting — Drake Hotel, Chicago, April 14-16.

American Gas Association, Southwest Personnel Conference—Buena Vista Hotel, Biloxi, Miss., April 16.

Southern Gas Association—Biloxi, Miss., April 16-18.

Public Utilities Advertising Association, Area Meeting, Regional 1-2-3—Philadelphia, Pa., April 23.

Natural Gasoline Association of America, 1947 Convention—Baker Hotel, Dallas, April 23-25.

Gas Meters Association of Florida-Georgia — Boca Raton, Fla., April 25-26.

U. S. Chamber of Commerce Annual Meeting—Washington, D. C., April 29-May 1.

American Gas Association Natural Gas Department Spring Meeting—Stevens Hotel, Chicago, April 30-May 1.

May

Industrial Gas School—Hotel Seneca, Columbus, Ohio, May 5-9.

Southwestern Gas Measurement Short Course—University of Oklahoma, Norman, Okla., May 6-8.

Commercial Gas School—Washington D. C., May 12-16.

Indiana Gas Association—French Lick Springs Hotel, French Lick, Ind., May 15-16.

Pennsylvania Gas Association — Wernersville, Pa., May 20-22.

Canadian Natural Gas and Petroleum Association—Royal Connaught, Hamilton, Ontario, May 22-23.

Liquefied Petroleum Gas Association—Hotel Sherman, Chicago, May 27-29.

Gas Appliance Short Course—University of Tulsa, Tulsa, Okla., May 27-30.

June

American Gas Association Joint Production and Chemical Committee Conference—Hotel New Yorker, New York City, June 2-4.

Canadian Gas Association—General Brock Hotel, Niagara Falls, Ontario, Canada, June 9-11.

American Society of Mechanical Engineers, Semi-Annual Meeting—Chicago, June 16-19.

American Gas Association Residential Gas Section, New York-New Jersey Gas Sales Conference—Essex and Sussex Hotel, Spring Lake, N.J., June 23-24.

July

Michigan Gas Association—Grand Hotel, Mackinac Island, Mich., July 7-8.

September

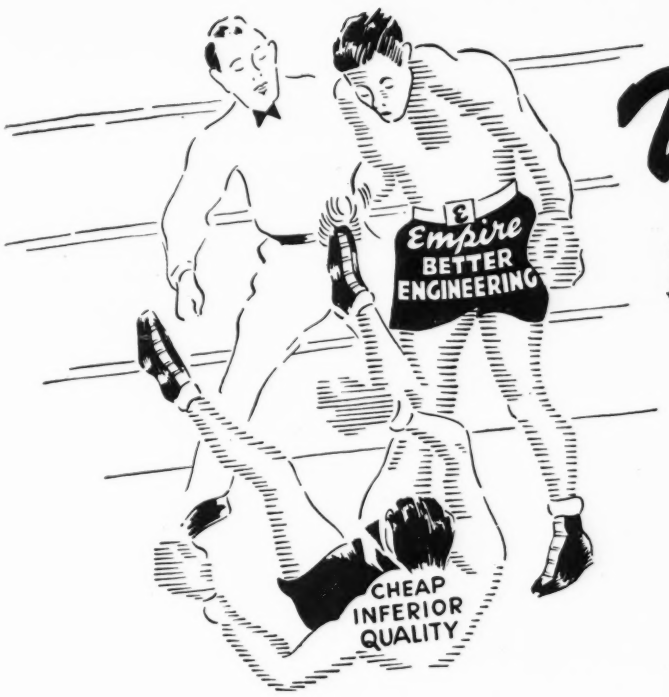
American Society of Mechanical Engineers, Fall Meeting—Salt Lake City, Utah, Sept. 1-4.

Pacific Coast Gas Association 1947 Convention—Coronado, Calif., Sept. 23-25.

American Gas Association Annual Convention—San Francisco, Calif., Sept. 29-Oct. 3.

October

National Metal Congress and Exposition—Amphitheater, Chicago, Oct. 20-24.



We're in the ring for YOU

To whip Poor Construction and Performance—to bring YOU only TOP QUALITY

Top Quality Materials

Empire Engineers pretest and prove materials available for building gas heating appliances. Only those are accepted that prove to give best heating results with assurance of a long life of service.

Top Quality Construction

Empire Engineers determine correct design for best performance and safety. Then latest type precision machines form parts to minute exactness. Mass production and modern line assembly bring you appliances at lowest possible cost.

Top Quality Performance

Years of customer satisfaction is the record of Empire thruout the nation. Now with the efficient performance of the patented Empire burner, operating in scientifically constructed units, Empire appliances are unsurpassed for heating satisfaction. Write us for full information.

Empire GAS Floor Furnaces, Circulator and Forced Air Heaters

Empire Stove Company

BELLEVILLE, ILLINOIS

MANUFACTURERS OF GAS HEATING AND COOKING APPLIANCES

GAMA Meets in Chicago April 14

"DEADLINE for Action," a highly controversial film produced by the CIO, will be an extra feature of the annual meeting of the Gas Appliance Manufacturers Association, being held at the Drake Hotel in Chicago this month. Showing of the film will climax the three-day affair, which starts April 14.

Branded as " a clever, subtle job of spreading the Communist party line" on the one hand, and praised as "the best educational weapon for labor" on the other, the film was produced by Carl Marzani, who was recently removed from his State Department post for concealing alleged party affiliations.

The usual brilliant array of gas industry talent will add luster to the convention. R. H. Hargrove and H. Carl Wolf will represent the A.G.A.; Henry J. Taylor, author and war correspondent, will entertain at luncheon; I. Austin Kelly III of the National Employee Relations Institute will speak; Lyman Hill of Servel will talk on "postwarfare logistics."

The program:

First General Session—Tuesday, April 15

Presiding—D. P. O'Keefe, president.
Opening Remarks—D. P. O'Keefe.
Report of Treasurer—John Van Norden.
Report of General Nominating Committee—A. B. Ritzenthaler, chairman.
Election of Officers.
President's Address.
"We Serve"—R. H. Hargrove.
"Aggressive Programs Make a Progressive Industry"—H. Carl Wolf.
Report of Managing Director.
GAMA Luncheon. Speaker—Henry J. Taylor.

Second General Session—Wednesday

Presiding—D. P. O'Keefe.
"The Liquefied Petroleum Gas Industry and Its Relation to the Gas Business"—Howard D. White, executive vice president, Liquefied Petroleum Gas Association.
" 'Postwarfare'—Logistics of the Competitive Battle"—Lyman L. Hill.
"Present Day Trends in Employee Benefit Plans"—I. Austin Kelly, III.
"Deadline for Action"—A motion picture produced by the CIO.
GAMA Luncheon. Speaker—Col. Jack Major, humorist.

Division and Group Meetings
Monday

Domestic Gas Range Division, Executive Committee. L. C. Ginn, chairman.
Domestic Gas Range Division. L. C. Ginn, chairman.
Gas Boiler Group. L. H. Hobson, chairman.
Gas Air Conditioning Group. J. K. Knighton, chairman.
Gas Conversion Burner Group. G. A. White, chairman.
Direct Heating Equipment Division. G. H. McFadden, chairman.
Gas Clothes Dryer Division. L. F. Worth, chairman.
GAMA Board of Directors. D. P. O'Keefe, chairman.

Tuesday

"CP" Manufacturers Group. E. Carl Sorby, chairman.
Gas Furnace Group. I. E. Seith, chairman.
Gas Water Heater Division. H. E. Handley, chairman.
Controls and Related Accessories Division. T. T. Arden, chairman.
Gas Valve Division. R. L. O'Brien, chairman.

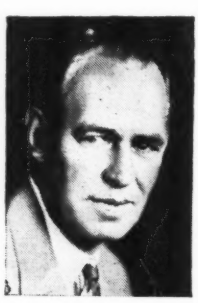
Wednesday

Hotel, Restaurant and Commercial Gas Equipment Division. W. H. Rudolph, chairman.
Gas House Heating and Air Conditioning Equipment Division. C. A. Olsen, chairman.
Industrial Gas Equipment Division. E. J. Haedike, chairman.
Gas Meter and Regulator Division. F. Whitworth, chairman.

Midwest Gas Group To Confer In Omaha

WITH mornings devoted to matters of general interest to the gas industry, and afternoons allotted to meetings of sales and operating sections, the 42nd annual meeting and convention of the Mid-West Gas Association gets under way for a three-day stretch April 7, at the Hotel Paxton, Omaha, Neb.

Top spots on the agenda for the general sessions have been saved for Robert W. Hendee, A.G.A. second vice president; E. C. Deane and A. C. Rathkey, president and second vice president, respectively, of the Mid-West Gas Association; E. A. Jamison, Phillips Petroleum Co.; D. L. Sedgewick, chairman, Midwest Personnel Conference; and W. J. Grover, Surface Combustion Corp. Hendee will pull aside the curtain on the future of the industry; Jamison will show what LP-Gas can do for the gas companies; Sedgewick will enlighten members on the work of the personnel conference, and Grover will discuss economic problems.



D. L. Sedgewick

R. W. Hendee

Salesmen will be attracted to the two afternoon meetings by such subjects as commercial gas sales, presented by I. S. Anoff, Albert Pick Co.; New Freedom Kitchen, by H. Vinton Potter, A.G.A.; hot water demand for washing, with M. R. Roger of Bendix speaking; the CP range program, by Jim Gorton, GAMA; school equipment sales competition, by L. D. Crandall, Tappan Stove Co.; and a panel discussion on dealer cooperation as it fits into postwar merchandising.

The two meetings of the Operating Section will offer K. R. D. Wolfe, Fisher Governor Co., speaking on "Saving 'Unaccounted for' by Modern Pressure Control"; Everett Darnold, McCabe Powers Auto Body Co., on standard gas company trucks; John E. Heil, Peoples Gas, Chicago, on small openings; Cecil Miller, Iowa-Illinois Gas, on changeover to higher pressures; George Johnson, Minneapolis Gas Light, on chimney liners; and C. H. Smith, Nebraska Natural, on farm product dehydration.

ASME

Boiler Code Changes

Proposed revisions in Sec. 8 of the American Society of Mechanical Engineers' Boiler Construction Code (unfired pressure vessels) will be submitted at two hearings next month. The first will be held at Houston, Texas, at the Rice Hotel, May 1 at 8 p.m.; the second at Los Angeles, Calif., at the Biltmore Hotel, at 9:30 a.m. on May 7.

At the hearings, manufacturers, users, and state enforcement authorities will be given an opportunity to express their views on the amendments, which were drawn up by a special committee of the ASME in January. Copies of the recommendations are available at $1 each from ASME headquarters, 29 West 39th St., New York.

Coincidental with the sessions, the National Board of Boiler and Pressure Vessel Inspectors will hold its general meeting May 5, 6, and 8 at the Biltmore, and on May 9 the Boiler Code Committee will also meet there.

NGPAC

Canadian Convention

Opened with a golf tournament on Thursday morning, the annual convention of the Natural Gas and Petroleum Association of Canada will be held for two days, May 22 and 23, at the Royal Connaught Hotel, Hamilton, Ont. The traditional banquet will wind up the conference the following evening.

TECHNICAL TRENDS

By GUY CORFIELD

Gasification of Coal

RECENTLY the gas industry noted two news items that appeared to be of considerable interest. One was the prediction that, in the not too distant future, gasification of coal would produce 1000-Btu gas that could be delivered to the East coast from Pennsylvania at a price cheaper than Texas natural gas. The other was the announcement that the Alabama Power Co., in a coal mine at Gorgas, Ala., was actually experimenting with underground or "in place" gasification of coal. Still more recently this experiment has been further publicized, but no technical details have been released.

Essentially this underground gasification process consists of promoting and maintaining partial combustion of an underground coal seam by feeding air (or oxygen) and steam into the seam through one shaft and removing the gaseous products through another shaft. Obviously the Btu of the resulting gas would be higher if oxygen were used instead of air, and might only be high enough for practical usage if oxygen were employed. Similar experiments have been reported under way in Russia for at least 10 years, but it is stated that the highest Btu obtained even with oxygen-enriched air has been 191. This does not seem to be very encouraging.

This again brings up the subject of oxygen which, if cheap enough, could revolutionize many gas making processes. An excellent article on oxygen production may be found in the January, 1947, issue of "Chemical Engineering," page 123. It is estimated that, with presently known techniques, large volume plants could produce oxygen of 95% purity for from 10 to 18 cents per Mcf, which is only 4% of the present cost of high purity (99.5%) oxygen. Another interesting development is the transportation of oxygen by railroad tank cars, and storage in insulated tanks, in the liquid state, at atmospheric pressure at a temperature of about —300° F.; under these conditions, 863 standard cu. ft. of oxygen gas occupy 1 cu. ft. of liquid volume.

Technical Education

MANY people are giving serious thought to the future trends in technical education. There are some who feel that, in this age of specialization, all the knowledge that a student can acquire on a given phase of technology will be none too much. Others believe that a broad general education should be attempted to provide wide background and versatility for the future avocation, whatever it may be.

In this connection it is interesting to consider the words of Bradley Dewey, president of the American Chemical Society, spoken last summer before the Australian Chemical Institute at Sydney during an address on "What We Saw at Bikini." A quotation, from "Chemical and Engineering News," Aug. 10, 1946, is as follows:

> "And, incidentally, while I am speaking of education, I can't help but add here my hope that before long we shall see an entirely new approach to scientific and technical training in our schools. All of us older men have long realized that the barriers are breaking down, or have broken down, between classical chemistry and classical physics. The one, we know, blends into the other even as engineering merges into both. I know many of you will share my hope that we shall see a basic training of the future in which science will first be taught as a whole—as the complete knowledge of material things that it is. And when this broad science has been understood by the student, it will be time enough for him to concentrate upon specialties we shall term 'chemistry' and 'physics.' Of course, with such a modernized training we shall have to rejuvenate and enliven mathematics so that it will speak more eloquently the language of all science than it has done in the recent past."

Office of Technical Services

THE establishment of an Office of Technical Services has recently been announced by the Department of Commerce, Washington, D. C. This office is headed by John C. Green, and unifies the Publication Board, Technical Industrial Intelligence Branch, National Inventors Council, and Production Research and Development Division.

It will consist of the following divisions: Invention and Engineering, Industrial Research and Development, Library and Reports, and Technical and Industrial Intelligence. The latter is responsible for the investigation of German industry and the dissemination of German scientific and technical information. It has recently issued a report (that is available to interested persons) of German Methods of Obtaining Oil from Shale. These methods consist essentially of treating the oil shale with superheated steam, in a specially-designed, continuously-charged retort, with recovery of the vaporized oils and gases.

De-Fogging Air Fields

AT Arcata, just above Eureka on the north coast of California, government officials are experimenting with various ways and means of landing airplanes on a fog-bound airfield. One method is to heat the air and thus dissipate the fog, using burners at ground level which project flames several feet upward. It is reported that, using diesel oil, such flame equipment is effective at a fuel cost of approximately $100 for five minutes, which is long enough to bring a plane down and cheaper than keeping it in the air; installation cost, however, is estimated as $185,000 for a major airport. At locations within reasonable proximity of gas mains, it seems possible that this could be easier and cheaper done with gas, and might be a profitable non-peak load.

PROMOTIONAL NOTES AND NOTIONS

By STANLEY JENKS

Price Stabilization

WHILE there have been a few minor gas rate increases in the manufactured gas field, the industry generally is doing a remarkable job of holding its service rates to pre-war levels. But — I wonder if the public is being made to appreciate it sufficiently. It is a most important public relations point in these days of sock-'em plenty.

Today's inflated prices are a real menace to our economy. You've only got to see how we are pricing ourselves out of the market in Latin America to appreciate that. Granted, prices today are mostly a question of supply and demand, and the logical assumption is that competitive pressure will force manufacturers and suppliers to find ways and means to cut costs despite labor rate increases. But, as an average citizen, did I nearly blow my top when a renewal of my automobile insurance came in recently? Exactly the same coverage as last year—mind you—and it costs 59.6% more. This does not include collision insurance, where the insurance company is most vulnerable.

What a howl would arise to heaven if gas service rates advanced like that! It is some consolation to know that price-wise, we are fighting the good fight to keep the dollar as nearly worth a dollar as possible.

A Challenge

R. E. GINNA, vice president, Rochester Gas and Electric Corp., ranks among our industry's ace economists and better prophets. For years, his discerning analyses of our industry's development problems have been recognized in this corner as just about as good as they come. He has the advantage of being a so-called "combination utility" man, and is therefore in a position to give a more unbiased viewpoint of the electrical competitive situation.

In a paper presented before the Consumer Credit Division of the American Bankers Association in St. Louis last January, Mr. Ginna gave some estimated appliance sales figures for 1947, which must, of course, be taken seriously. Here they are:

Appliance	*Gas*	*Electric*
Refrigerator	500,000	3,600,000
Water Heater	1,200,000	500,000
Range	1,800,000	1,000,000

If Mr. Ginna is right — and the burden of proving him wrong rests with the gas industry — then the electric refrigerator lads are going to outsell us better than 7 to 1. And for every 2.4 gas water heaters sold, there will be one electric water heater installed. In the cooking field, on which our whole residential rate structure is built, the sales ratio will be narrowed to only 1.8 to one in favor of gas. Sounds preposterous, doesn't it?

This estimated encroachment on our residential load is appalling, and of course should be prevented with every promotional means we have.

In the same paper, Mr. Ginna cites the selling record of around 15,000 master plumbers, who sold nearly $15 million of automatic gas water heaters during 1946. Such a group can be valued as fine load-building allies. Let's hope they made plenty of profit, that they have tasted blood, and that they will be encouraged to sell twice as much this year. But what about the specialty and hardware dealers? Traditionally, they are better merchandisers than the plumbers. It will be more comforting when we hear more and more dealer spot radio advertising on gas appliances, and less about their electrical opposite numbers.

Tourist Notes

I WILL swear there are more gas ranges on display in Mexico City stores today than there are in American cities of like size. This is all the more interesting because there isn't a therm of manufactured or natural gas available in the Mexican capital. The facts are the "bottled" gas distributors are really going to town. BP-gas is the gas industry there. A colleague residing there told me that they get adequate gas cooking service in their home for around $2.50 (U. S. currency) a month.

If you are planning to visit the "City of Eternal Spring" be sure to take a flashlight, or else be prepared to eat your dinner by candlelight, or stumble around your hotel with a candle stuck in a pop bottle. Electric interruptions are quite frequent, which might in itself be another reason why the citizenry prefers dependable gas service for cooking.

Paging Señor Po-ay

A MEXICAN government official one day asked me if I knew "Señor Oh-yay Po-ay." Come again, or as we linguists put it "*Mande por favor?*" He pointed to the Feb. 24 issue of "Time" on his desk and showed me the genial photo of Natural Gasman E. Holley Poe, president of the newly organized Texas Eastern Transmission Co., which, said "Time," had finally been able to purchase the Big and Little Big Inch pipe lines for $143.1 million.

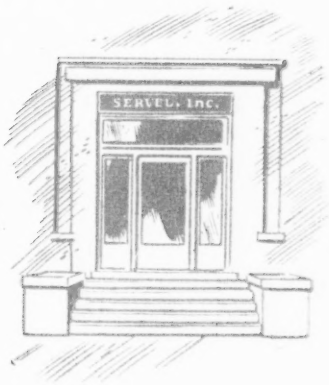
Of course, who doesn't know Holley Poe in the natural gas industry, or Oh-yay Po-ay as he seems to be known in Latin American circles below the Rio Grande?

It was the first news I had received of the completed transaction, which is of momentous importance to the gas industry.

It ought to add even more zip to the already zippy program arranged for the Spring Meeting of the Natural Gas Department, American Gas Association, to be held in the Stevens Hotel, Chicago, April 30—May 2.

on at SERVEL'S NEW HOMEMAKER'S INSTITUTE

AMERICA'S GREAT NEW



"HOME EC" CENTER

Just about a year ago, the new Servel Homemaker's Institute quietly opened its doors at Evansville, Ind. Since then, a growing staff has been at work here helping build the prestige of the Gas Industry.

Organized in three divisions—Home Economics, Kitchen Planning, Test Kitchen—its research has been fanning out in many directions. Problems of nutrition are natural for this group, for Servel, maker of the Gas Refrigerator, has always been interested in new developments in food and food use. Here has been initiated a fresh approach to the planning of modern kitchens, to bear results in the new Servel Unified Gas Kitchens. At the Institute, too, are conducted continuous experiments in use of Gas Appliances.

To tell you what is going on in the field, the Institute is issuing timely bulletins. First is the monthly Newsletter—brief, newsy, filled with facts.

For professionals and homemakers alike, the Servel Homemaker's Digest is issued by the Institute four times yearly. It gives a quick condensation of articles of household interest from leading home and women's publications —Good Housekeeping, Woman's Home Companion, House Beautiful, Better Homes and Gardens, House and Garden, Parents', Woman's Day, Family Circle.

The Servel Homemaker's Institute is alive to the needs of Gas Industry today. It will continue to build the modernity of Gas and Gas service today.

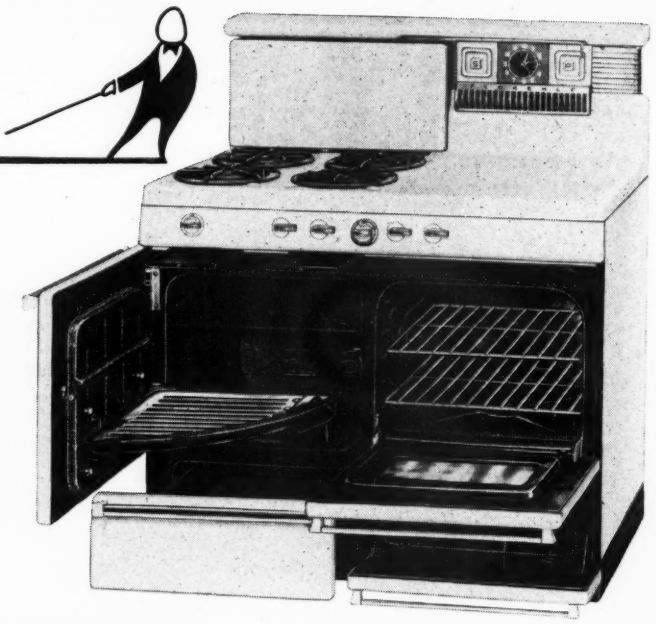
PUBLICATIONS—The monthly Servel Newsletter and the quarterly Homemaker's Digest bring news of interest to both professionals and consumers.

HOMEMAKER'S DIGEST
SERVEL HOMEMAKER'S INSTITUTE
KITCHEN PLANNING SECTION
Newsletter
PREPARED FOR THE USE OF KITCHEN PLANNING CONSULTANTS BY THE SERVEL HOMEMAKER'S INSTITUTE, EVANSVILLE, IND.
Are You "Color-Conscious"?

Servel
INC.
EVANSVILLE 20, IND.

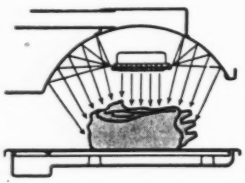
NEW APPLIANCE SALES POINTERS

Florence Range 4911



Top to bottom photos: Interior view of Model 4911; proper air-gas mixture made easily through top burner openings; exclusive Broilercue, which swings out with door.

Manufacturer: Florence Stove Co., 205 School St., Gardner, Mass.

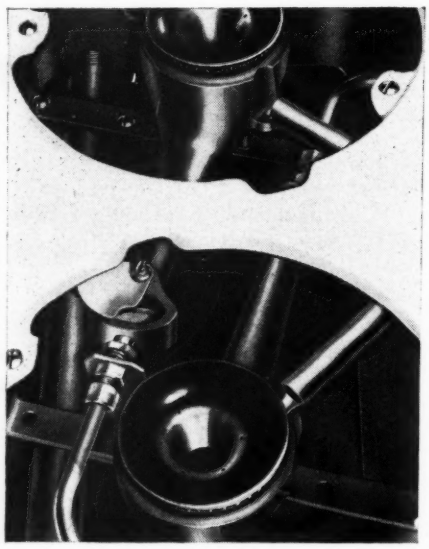


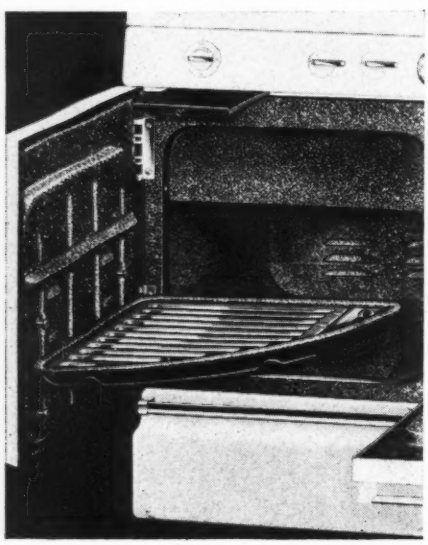
Florence gas range, Model 4911, has a unique feature which will appeal particularly to those customers who are looking for a broiler that will offer something extra in the way of results. Florence's answer to this demand is the "Broilercue" (patent applied for), with its "focused heat" principle.

Focused heat is obtained through the Florence-designed burner and arched reflecting roof, which, the company reports, distribute penetrating radiant heat evenly over the entire broiling surface. Result: a steak or roast that is "more delicious, more healthful, with minimum shrinkage."

Being divorced from the oven, the Broilercue construction makes possible simultaneous timing, so that casserole dishes may be removed from the oven at the same time as meats are removed from the broiler.

Other points which set the Broilercue apart are *its gas saving characteristic*—the focused heat results in quick, even broiling with a minimum amount of fuel, according to the company; *its accessibility*—the porcelained Broilercue pan fastens easily onto the heavy, reinforced door in any one of three positions, and swings out for easy inspection each time the door is opened; *its cleanliness*—deep broiling pan and interior construction place the well in the cool zone, where fats cannot become overheated and smoke, and the rounded corners of the stippled-porcelain liners lend themselves to easy cleaning.





Competing for the housewife's attention will be the "united and divided turret top." Built in a single piece, with smoothly rounded corners, it is simple to clean. Each burner has a separate opening, and is readily reached for servicing and for proper adjustment of mixtures.

These features are recommended for emphasis in selling the range:

1. Completely new United Turret-top design.
2. Exclusive Broilercue.
3. Extra large baking oven.
4. New top burner servicing features.
5. New C-Qwik Gas Cock handles.
6. Deluxe top light combination Telechron clock and time reminder.

The oven *(3)* measures 14 x 18 x 20 in., adequate for baking four-layer cakes with proper staggering for best results. Double Tuflex glass with insulating air space between panes forms a panoramic window for viewing the cooking in process. High temperatures are quickly reached through use of high speed burners and heavy Fiberglas insulation. Double oven bottom gives uniform heat distribution. Backguard switch operates oven light which illuminates oven interior. Heavy steel racks will pull out to safety stops without tipping. Oven is vented away from wall through backguard vent.

In addition to its ease of servicing *(4)*, each top burner has Hi-lo control with a fixed simmer flame. Automatic safety flash lighter ignites them; lily-shaped burner heads are removable for quick cleaning.

C-Qwik Gas Cock handles *(5)* indicate OFF, HI, and LO positions separately as the handles are turned, and are easily visible from a distance.

In addition to deluxe top light, clock and time reminder *(6)*, the cooking top offers folding top cover, which locks; removable, porcelained cast iron grates; removable porcelained spill-over bowl around each burner; removable drip trays concealed behind Broilercue door.

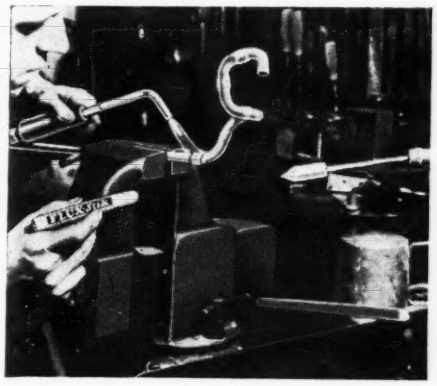
DIMENSIONS AND WEIGHTS

Length overall	40 in.
Depth, overall	26½ in.
Height, overall	49 in.
Height to cook top	36 in.
Oven ht., inside	14 in.
Oven width, inside	18 in.
Oven depth, inside	20 in.
Broilercue ht. inside	10¼ in.
Broilercue width inside	17 in.
Broilecure depth, inside	18½ in.
Approximate net weight	305 lb.
Approximate crated weight	365 lb.

NEW PRODUCTS

Soldering Flux Stick

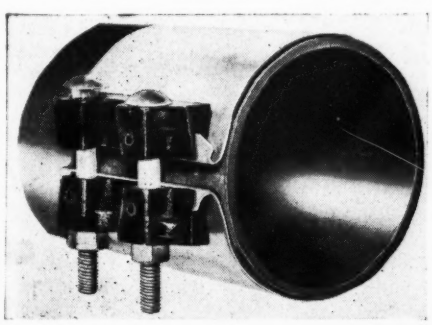
Lake Chemical Co., 607 N. Western Ave., Chicago 12, Ill.
Model: Flux-Stik.
Application: For soldering hot or cold metal. Ideal for overhead, inaccessible



locations where cleaning of the metal is clumsy and inconvenient. May be used for sweat joints of copper or brass tubing, manifolds, traps, elbows, piping, sheet metal, cabinet work, refrigeration and heating coils, etc.
Description: Flux-Stik is non-acid, yet it thoroughly and quickly dissolves the oxides of metals and prepares a free, clean and better surface for the solder to alloy itself with the metal. No cleaning of the metal is necessary. It is non-running; when heat is applied, the flux covers the immediate vicinity of the soldering joint but will not spread all over the surface of the metal. Waste is also prevented in this manner. Flux-Stik insures perfect joints, eliminating costly repairs. It is handy, convenient in use, and eliminates messy containers and brush and stick applicators.

Pipe Leak Repair Clamp

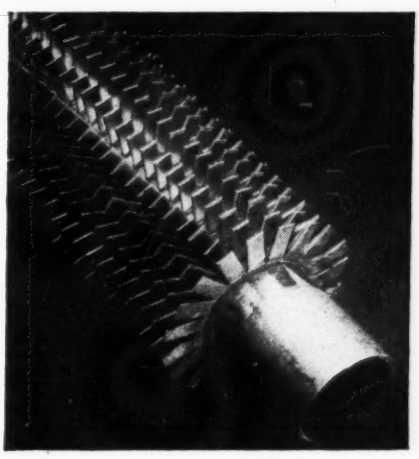
Smith-Blair, Inc., South San Francisco, Calif.
Application: According to the manu-



facturer, this clamp has features which make sealing off of leaks in pipe lines quick and as permanent as the line itself.
Description: Sizes now produced are for pipe from ½ to 30 in. in diameter, and it is adapted for all types of metallic pipe and for asbestos-cement pipe. The clamp has a copper band sleeve which gives about 100% wrap-around without using a tongue. A unique feature of this design is the cast lugs which can be reduced in length for 30-in. sleeves down to 3-in. sleeves in even multiples of 3 in. This change can be accomplished in the field without special tools, or furnished from the factory in any sleeve length.

Serrated Pipe

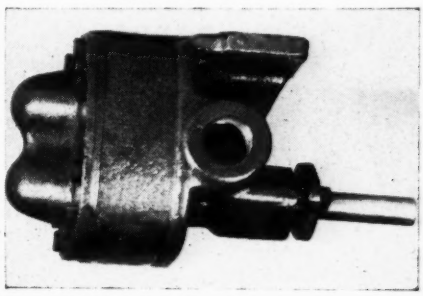
Cal-Fin Co., 1128 Mission St., South Pasadena, Calif.
Model: Cal-Fin Tubing.
Application: Utilizing copper fins on admiralty or copper tubing, this type of serrated fin surface is particularly suitable for use in fan cooled heat exchange equipment applied to the cooling of jacket water, high pressure gas and lubricating oil. It can also be supplied with steel fins welded to steel tubing for the convection banks of oil or gas fired furnaces.
Description: Cal-Fin tubing can be produced in sizes from ½ inch O.D. to 6 in. O.D. in any gauge. Stock tubing sizes are 5/8 and 1 in. O.D. 18 Ga. admiralty. Stock lengths are 16 and 20 ft.



Tubing comes cut to length with ends stripped, polished and reamed. Serrated fin design gives unusually high transfer rates on air side in relation to air pressure drop.

Rotary Pump

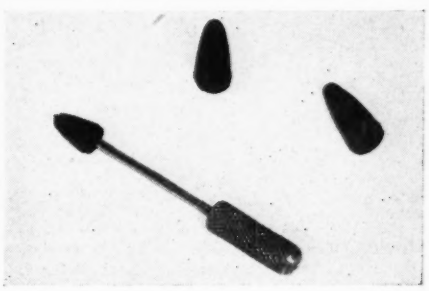
Worthington Pump and Machinery Corp., Harrison, N. J.
Model: GA Rotary Type.
Application: Designed for durability under severest service requirements and adaptability to variety of such require-



ments offered by industries.
Description: Design features include four-bearing construction and special herringbone rotors. Built-in pressure lubrication eliminates all external lubrication and the danger, prevalent in many industries, of liquid contamination. Simplicity of design offers easy maintenance and low first cost. Models are available footmounted or flange mounted with adjustable stuffing box and mechanical seal.

Tool Protector

Granger Manufacturing Co., 314 Sherbourne Drive, Los Angeles 36, Calif.
Model: Granger Point Protector.
Application: Simplicity keynotes this rubber protective device for sharp tools and pointed instruments. It serves as a safety measure and prevents torn



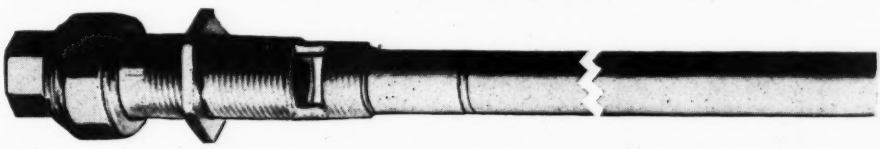
clothing. Precision instruments, pocket tools and pencils are kept in perfect condition.

Hot Water Tank Corrosion Preventer

The Cleveland Heater Co., 2310 Superior Ave., Cleveland 14, Ohio.

Model: The Elno Protector.

Application: Prevents corrosion of iron and steel hot water storage tanks, eliminating rusty water. May be fitted



to any make water heater.
Description: Elno is an alloy of magnesium and other metals. The Elno protector is rodlike in shape, made in 1 in. and 7/8 in. diameters, and equipped with a special fitting which serves as a hot water outlet and permits connecting the protector, tank, and hot water line into one rigid assembly. No attention is required after installation. Its electro-chemical protective process is continuous. Water may be heated above 150 degrees F. without fear of excessive corrosion. The Elno will appreciably lengthen the life of the tank. It represents a saving because inexpensive galvanized steel tanks, when provided with Elno, are immune to rust and corrosion.

PEOPLE

• **C. G. Wood,** director of sales for The American Coach & Body Co., Cleveland, Ohio, has announced the appointment of three sales managers. **Deming Bronson,** Central Division, has recently served as a consultant for The National Tube Co., Pittsburgh, Pa. He also spent many years with General Paint Corp., becoming a vice president of that firm in 1936. He will headquarter in Cleveland.

Homer A. Feyen joined American Coach & Body in 1946 as sales engineer, after four years in the army. His experience has been in automotive work and in the field of heating equipment. Feyen's headquarters, as Midwestern Divisoin sales manager, will be in Des Moines.

William R. Hall, Eastern Division, was an industrial specialist on the WPB during the war, and joined the firm in 1945. His offices will be in New York City.

• **R. J. Vandagriff,** general sales manager for Laclede Gas Light Co., St. Louis, was elected president of the Sales Managers Bureau of the St. Louis Chamber of Commerce for 1947 at a recent meeting of that organization.

• Appointment of **Robert C. Adams,** grandson of the company's founder, as vice president of Adams Brothers Mfg. Co., Inc., Pittsburgh, Pa., has been announced by **E. C. Adams,** president. Robert assumed his duties in February following completion of studies at Harvard Graduate School of Business Administration. He was graduated from the University of Pittsburgh in 1940. Last year he was relieved from active duty in the army after four years of service, including three years in the Pacific theater.

• **Kress V. Ludlow** has been appointed general sales manager of The Cleveland Heater Co., according to **Leo Friedman,** president. Ludlow joined the firm as a salesman in 1925 and later became district sales manager for territories served by The Columbia System and The East Ohio Gas Co. Prior to 1925, he spent several years with East Ohio. During the war he was in charge of production for Cleveland Heater. In his new capacity, Ludlow will be assisted by **S. C. Schnell,** who has been doing sales work with the company for 16 years.

• **Kenneth L. Walker** has been appointed vice president in charge of production of Kalamazoo Stove & Furnace Co., according to **Arthur L. Blakeslee,** president. Since 1940 Walker has been head of his own company in Detroit, known as Walker & Associates, consulting engineers. From 1926 to 1940 he handled planning, engineering, production management methods and served as department manager and consulting engineer for seven different firms.

• **Harlan G. Pingrey** has been appointed advertising manager for the South Wind Division of Stewart-Warner Corp., Indianapolis, Ind. The division manufactures and distributes car, truck and airplane heaters and the South Wind Midget Furnace. For the last 18 months Pingrey was a partner in Kempshall Associates, Chicago, commercial art studio. From 1940 to 1945 he was a member of the Chicago staff of J. Walter Thompson Co.

• **Robert L. Fowler,** president, Florence Stove Co., has announced that **Robert H. Taylor** is the company's new general sales manager. Taylor has a 14-year sales record with the firm, having become assistant manager of the New York sales division in 1937 and manager of it in 1941.

• **C. F. Royse,** formerly with the Griscom-Russell Co., has been appointed district engineer of The Fluor Corp., Ltd., in charge of its Houston office. After graduation from Rice University in Texas, Royse worked for Humble Oil Co. and later for Griscom-Russell.

• **R. S. (Bob) Agee** has announced his resignation as vice president and director of Roberts & Mander Corp., Hatboro, Pa., in order to establish his own manufacturers sales agency and wholesale marketing business. Temporary headquarters will be located at 237 N. Bent Road, Wyncote, Philadelphia, Pa. Plans call for concentrated coverage of utility and retail outlets in the adjacent Mid-Atlantic area.

Agee launched the national CP range program while serving as sales promotion manager of the Gas Appliance Manufacturers Association. Before his three years with GAMA, he was sales promotion manager for the Washington Gas Light Co., Washington, D. C.

• **George H. Halbert,** prominent New York attorney, has been named general attorney of Rheem Manufacturing Co., it was announced by the board of directors. Halbert joined the company in 1945 as assistant to the general attorney, **J. Harold Merrick,** who resigned Feb. 1. During the war, Halbert was with the executive office of the Secretary of the Navy, Office of General Counsel, where he served as Counsel of Special Devices Division.

• **Bruce R. Tritton,** vice president of American Stove Co., Cleveland, Ohio, has been reappointed chairman of the excise tax committee of the Institute of Cooking and Heating Appliance Manufacturers. The committee is charged with the responsibility of showing the unfairness of an excise tax on such a completely essential household item as a cooking range.

• **Jane Marshall** has been appointed home service director of the Gettysburg Gas Corp., Pittsburgh, and will make her headquarters in the district office in Cumberland, Md. She will be responsible for many phases of home service activity, under the general direction of **Flora G. Dowler,** home service supervisor of the Manufacturers Light and Heat Co.

• **Dorman A. Meyer,** formerly associated with Cincinnati Gas & Electric Co. for 10 years, has been named sales engineer for South Atlantic Gas Co., according to **Buell G. Duncan,** vice president. Meyer will be in charge of commercial and industrial gas installations for Orlando, Winter Park, Sanford, Deland and St. Augustine, Fla.

• At the March 3 annual meeting of the Rockwell Manufacturing Co. board of directors **W. F. Rockwell, Jr.,** was elected president. He had been serving as vice president and general manager. **Col. Willard F. Rockwell,** who has been president and board chairman, will retain the office of chairman of the board.

• The board of directors of Cribben & Sexton Co. recently elected **William M. Hillborn** president, succeeding **George D. Wilkinson, Sr.,** who retains the position of chairman of the board. **Thomas H. Heneage** was elected vice chairman of the board, and **Sidney R. Hill** was named controller. **George D. Wilkinson, Jr.,** secretary of the company, was also made a member of the board. **Wendell C. Davis** was reelected vice president and treasurer. **W. C. Wilkinson** has been appointed purchasing agent of the firm, succeeding **Carl E. Lyon,** who retired Jan. 1.

R. C. Adams

K. V. Ludlow

. . . named executives

C. F. Royse

R. S. Agee

. . . change affiliations

W. F. Rockwell, Jr.

W. M. Hillborn

. . . new presidents

Famous for looks
Famous with cooks

MODEL 7468-L-CP

cp

Automatic gas cooking is provided by this range which has all Certified Performance features.

HARDWICK *Gas* RANGES

HARDWICK STOVE COMPANY
CLEVELAND, TENNESSEE

COPYRIGHT 1947, THE HARDWICK STOVE COMPANY

PEOPLE

• **L. M. Morley** has been elected a vice president of Minneapolis - Honeywell Regulator Co. He is vice president in charge of sales for the Brown Instrument Co., Philadelphia, Honeywell subsidiary, and will continue to supervise sales of the Brown division. His promotion makes him an officer of the parent company as well as of its subsidiary.

• At a Jan. 15 meeting, the board of directors of Worthington Pump and Machinery Corp. elected **S. Riley Williams** vice president in charge of foreign business. Williams joined Worthington in 1920 and until 1941 resided in Europe as managing director of the company in Spain and in France, and finally as general European manager. He returned to the U. S. and served as assistant to the vice president in charge of operations. His new headquarters will be at the home office in Harrison, N. J.

• On March 3 **Brig. Gen. James Creel Marshall** assumed his duties as a member of the engineering staff of The M. W. Kellogg Co., Jersey City, N. J., and New York City. Among General Marshall's recent army activities was formation of the organization which became the Manhattan Engineer District, charged with development of the atom bomb. He will apply his knowledge and experience to engineering and research projects in Kellogg's immediate program.

• **Carl A. Eversman** has been promoted to plant superintendent of the Lorain, Ohio, division of American Stove Co. The division makes oil stoves and heaters. Eversman has served as industrial relations manager of the plant since 1945 and will retain this position along with his new responsibilities. During the early war years, he was in charge of training war workers for all Lorain industries.

• **Christy Payne, Jr.,** has been named vice president of the New York Natural Gas Co., Pittsburgh. He has been associated with The Peoples Natural Gas Co. in sales work for the past 18 years, becoming sales manager in 1937. Payne will continue as sales manager of Peoples Natural. Both companies are subsidiaries of Consolidated Natural Gas Co.

J. M. Floyd

• **D. A. Hulcy,** president, Lone Star Gas Co., Dallas, has announced the appointment of **James M. Floyd** to succeed **Will C. Grant** as advertising director, effective April 1. Grant, who organized the firm's advertising department in 1929, will be southwestern editorial representative for Robbins Publishing Co., New York. Floyd has been connected with the company since 1937. He is widely known in public and civic organization circles and was formerly assistant city attorney of Fort Worth.

• **A. P. Smith,** national service manager for Bendix Home Appliances, Inc., has announced appointment of three staff members. They are **Wayne H. Hollett,** Lafayette, Ind., service training coordinator; **Donald H. Scott,** Waltham, Mass., service supervisor for Canada; and **Kenneth H. Teeter,** South Bend, Ind., service specialist on the Bendix automatic home ironer.

• **Glenn R. Chamberlain,** first vice president and director of Michigan Consolidated Gas Co., celebrated the 50th anniversary of his career as a gas company man on Feb. 1. He began as a timekeeper-clerk for Grand Rapids Gas Light Co. on Feb. 1, 1897, remaining with that firm until 1938 when it was acquired by Michigan Consolidated.

• The Aviation Advisory Committee to the Petroleum Industries Committee of the American Petroleum Institute has elected the following officers for the year 1947: **Aubrey Keif,** The Texas Co., chairman; **L. A. Henry,** Standard Oil Co. of Indiana, vice chairman; and **A. T. Hapke,** American Petroleum Industries Committee, secretary.

• The appointment of **Gerald L. Andrus** as comptroller of New Orleans Public Service, Inc., was announced recently by **Harold E. Meade,** executive vice president. Andrus, a graduate of Tulane University, began working for the utility in 1928 as a clerk in the gas plant stockroom.

"THE RAZOR'S EDGE"

is no finer, no more durable, no longer-lived than the QUALITY of the steel, the EXPERTNESS of its tempering, and the SKILL of the workmen that fashion it.

THE SAME IS TRUE

in the designing, engineering, supervision and construction of the machinery and equipment for the PEAK LOAD or STANDBY Plants that assure gas utilities of their ability to meet every requirement of public service, under the most trying and exacting circumstances.

Quite naturally, Southern Gas & Equipment Co., a pioneer in the Liquefied Petroleum Gas equipment design and manufacturing business, feels it is in a most favorable position to aid the gas utility industry, with

PLANNING, DESIGNING, CONSTRUCTION KNOW-HOW

We have combined in this service some of the best qualified engineers in the LP-Gas, Natural Gasoline, Petroleum Refining, and Chemical Industry engineering and construction fields, PLUS an enviable reputation for the production of the very best in LP-Gas storage equipment and fittings. We invite consideration of your problems, without obligation on your part.

SOUTHERN GAS & EQUIPMENT CO.

Atco Bldg.
Tulsa, Okla.
Phone 4-2448

Gas SOUTHERN Systems

Branches—
Sapulpa and
Enid. Okla.,
Atlanta, Ga.

TEXAS DIVISION — 4605 Montrose Blvd. — Houston

COLUMBIA GAS SYSTEM in 1946

From the Annual Report of Columbia Gas & Electric Corporation

Columbia Gas System is now engaged principally in producing, purchasing, transporting and selling gas. During 1946, Columbia Gas & Electric Corporation complied with the Securities and Exchange Commission's order for geographic integration. This included the sale of its interest in The Dayton Power and Light Company and The Cincinnati Gas & Electric Company.

Columbia Gas System now consists of the parent Corporation, Columbia Engineering Corporation, the subsidiary service company, and nineteen subsidiary operating companies constituting a completely integrated system.

The System supplies directly or indirectly, about 1,500,000 residential, commercial and industrial customers in Kentucky, Maryland, New York, Ohio, Pennsylvania, Virginia, West Virginia and the District of Columbia.

During the year the Corporation redeemed its Bank loans, Debenture Bonds and Preferred and Preference Stocks and two new issues of Debentures were sold at lower interest rates. This refinancing leaves the Corporation with only one class of stock, subject to $97,500,000 of debt in short term serial Debentures and long term sinking fund debentures—a sound and conservative capital structure.

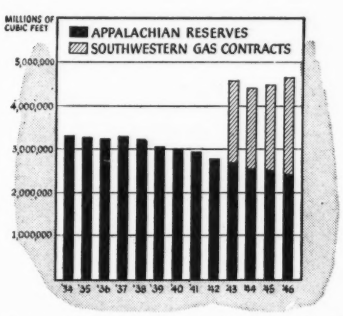
COLUMBIA GAS & ELECTRIC CORPORATION AND SUBSIDIARY COMPANIES
PRO FORMA CONSOLIDATED INCOME STATEMENTS

	1946	1945	1944	1943	1942	1941	1940	1939	1938	1937
	$	$	$	$	$	$	$	$	$	$
Subsidiary Companies:										
Gross Revenues	95,070,481	86,917,688	83,329,353	87,880,149	81,217,593	75,025,186	73,223,570	65,698,462	61,101,352	68,834,327
Operating Expenses and Income Deductions	75,907,977	70,419,714	67,065,962	71,854,730	66,163,901	61,127,278	58,822,023	52,025,856	49,807,975	53,078,969
Balance Applicable to Corporation	19,162,504	16,497,974	16,263,391	16,025,419	15,053,692	13,897,908	14,401,547	13,672,606	11,293,377	15,755,358
Columbia Gas & Electric Corporation:										
Net Expenses	1,578,126	1,633,197	1,949,813	1,920,152	1,772,249	1,417,328	1,353,888	1,566,753	1,403,123	1,490,842
Balance Before Fixed Charges	17,584,378	14,864,777	14,313,578	14,105,267	13,281,443	12,480,580	13,047,659	12,105,853	9,890,254	14,264,516
Fixed Charges:										
Interest on Debentures	2,796,875	2,796,875	2,796,875	2,796,875	2,796,875	2,796,875	2,796,875	2,796,875	2,796,875	2,796,875
Other Deductions	108,757	112,728	108,306	127,704	139,038	194,204	192,420	203,941	260,045	286,641
Total Fixed Charges	2,905,632	2,909,603	2,905,181	2,924,579	2,935,913	2,991,079	2,989,295	3,000,816	3,056,920	3,083,516
Consolidated Net Income*	14,678,746	11,955,174	11,408,397	11,180,688	10,345,530	9,489,501	10,058,364	9,105,037	6,833,334	11,181,000
Consolidated Net Income per Share of Common Stock Outstanding										
Before Provision for Retirement of Debentures*	1.20	.98	.93	.91	.85	.78	.82	.74	.56	.91
After Provision for Retirement of Debentures*	1.04	.81	.77	.75	.68	.61	.66	.58	.40	.75

The above statements are on a "pro forma" basis—that is, they have been restated as though the System during the periods covered had been the same as it is now. These "pro forma" statements and figures exclude, for the entire periods covered, the operations of companies which have been divested and give effect to the refinancing which has been completed. Only on this "pro forma" basis can information concerning past periods be given which is in any sense applicable to the present System; however it must be remembered that the present System did not exist as such in these past periods and the pro forma figures are of necessity restated figures, adjusted to project a present situation into the past.

*The Indenture securing the Corporation's new Debentures requires the Corporation to make regular annual payments for the retirement of Debentures, ranging from $2,000,000 in the years 1947 through 1949 up to $3,700,000 in 1970. Although payments to retire debt are not, strictly speaking, charges against income, they must be taken into account in any realistic view of the balance of earnings which the Corporation will have available for Common Stock dividends. Accordingly, in the pro forma income statements for past periods, the net income per share of Common Stock has been shown both before and after deducting from net income an amount of $2,000,000 for debt retirement.

COLUMBIA'S GAS RESERVES



There is ample gas in Southwest fields which, with The System's Appalachian supply, is sufficient to service Columbia's customers for many years to come. All that is needed are new transmission facilities, construction of which was virtually halted by the shortage of steel and other materials. Columbia's gas reserves are currently estimated at 4,633,000,000 Mcf.

The information set forth here is not given in connection with any sale, offer or solicitation of an offer to buy any securities.

COLUMBIA GAS SYSTEM

The Manufacturers Light and Heat Co. **The Ohio Fuel Gas Co.**
United Fuel Gas Company

Amere Gas Utilities Company **Home Gas Company**
Binghamton Gas Works **Natural Gas Co. of W. Virginia**
Central Kentucky Natural Gas Co. **Cumberland & Allegheny Gas Co.**
Gettysburg Gas Corporation **The Keystone Gas Co., Inc.**
Virginia Gas Distribution Corporation

• **George W. Wharton, Jr.,** wartime chief of the advertising section of the American Red Cross, has been appointed service and distribution manager of the Brand Names Foundation. The announcement was made by **Henry E. Abt,** managing director of the foundation.

• Harnischfeger Corp., Milwaukee, has announced the appointment of **Ralph D. Holcomb** as general sales manager. He will direct the sales of all the firm's products, including excavators, road machinery, hoists, cranes and welding equipment.

• **Floyd Jones** has been appointed sales manager of the portable compressor division of Davey Compressor Co., Kent, Ohio. Jones has been Davey's northeastern district manager in charge of the New York, New England and southeastern Canadian territories.

• **Dr. Theodore W. Evans** has been appointed manager of the Emeryville research laboratories of Shell Development Co., according to an announcement by A. E. Lacomble, president. Evans succeeds **Walter J. Hund,** who died Feb. 17.

• **E. W. Heffernan** has been appointed manager of the new Philadelphia sales and service office of Wheelco Instruments Co., Chicago, Ill. The Philadelphia headquarters are located at 424 W. Olney Ave.

• **Allen T. Greiner,** president of The American Coach & Body Co., has announced the election of **Harvey F. Berghaus** to the board of directors and as vice president in charge of manufacturing. Berghaus has worked his way up in the company, serving in many capacities since his first connection with the firm in 1928.

• **John R. Suman,** vice president and director of the Standard Oil Co. of New Jersey, has been appointed as chairman of the American Petroleum Institute's Central Committee on Standardization of Oil Field Equipment. Suman succeeds the late **J. Edgar Pew,** chairman of the committee since its inception.

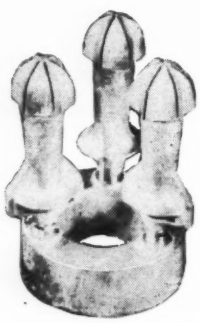
Dr. B. Goerg

• **Dr. Bernard Goerg** has announced his resignation as director of the Institute of Thermal Research of the American Radiator & Standard Sanitary Corp. He entered the services of American Radiator in 1925 and for the past 11 years, as director of the institute, has been in charge of the designing and engineering of all the corporation's heating products. After a short rest, Goerg intends to re-enter the manufacturing business.

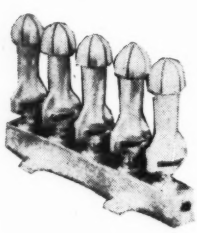
• **Charles H. Rambo,** operating engineer of The Gas Service Co. at Joplin, Mo., has been promoted to superintendent at Independence, Mo. The former superintendent of the Independence property, **Loan W. Richardson,** resigned recently.

SHAW

Lifetime Conversion Burners



Round Manifold



Straight Manifold

One to Fifty Burners, Round or Straight Manifold made to fit any furnace, regardless of size or shape. Cast Venturi tube with sawed burner ports. Automatically air-cooled head containing six air shafts 3/16" deep.

The startling design of the SHAW BURNER permits absolute control of secondary air with direct application to burner head insuring protection from dangerously high temperatures and providing better combustion. Natural, Manufactured or LPG Gases.

FLOOR FURNACES
45,000 and 55,000 B.T.U.
A.G.A. Approved

FOR!

Immediate Delivery!

"To Shawburnize is to Economize"

Manufactured by

SHAW BURNER COMPANY, INC.

P. O. BOX 203 — PHONE 2274

Arkansas City, Kansas

Obituaries

E. L. White

• **Edwin L. White,** former vice president and member of the board of directors of The Laclede Gas Light Co., St. Louis, died Feb. 11 at his home in Kirkwood, Mo. He retired from Laclede because of illness in May, 1941. White joined the St. Louis firm in 1922, after serving for nine years with the Missouri Public Service Corp.

• **H. R. Shidel,** 53, manager of the Dresser Manufacturing Division's Houston warehouse, died Feb. 28 at Houston, following a heart attack. He had always been engaged in selling activities in the oil industry. Before joining Dresser in 1937, Shidel was with the Eagle Pitcher Lead Co., Cincinnati, Ohio.

• **Homer Victor Smith,** 45, manager of Lone Star Gas Co.'s Cleburne, Texas, district of distribution, died from a heart attack on March 11 at his home. He had been with Lone Star since July, 1926.

SALES SLANTS

Minneapolis Gas Light Co.

An unusual cartoon-style public relations campaign based on the theme "Such Popularity Can Be Embarrassing" is appearing in newspaper ads for the Minneapolis (Minn.) Gas Light Co.

Designed as an informal explanation of gas equipment shortages, the series emphasizes the "embarrassing popularity" created by public demands.

Cartoons depict the embarrassed small fry with the one ice cream cone in the crowd; the stymied belle meeting two suitors at the door; the crooner mobbed by admirers at the stage door; the enthusiastic male (accompanied by wife) as observer of a midway hula, and other "embarrass" situations.

Informal copy tone makes capital of not being able to fill demands, but promises to supply needs as quickly as possible.

Houston Natural Gas Corp.

"Targets for 1947" was the title of the program for Houston Natural's annual cooperating dealer meetings, held Feb. 25, 26 and 27 in Houston, Victoria and Alice, Texas. Nearly 300 cooperating dealers and company personnel attended the opening dinner in Houston, and there were over 100 present at similar meetings in Victoria and Alice. President Frank C. Smith outlined the company's program for the current year and introduced the featured guest, E. Carl Sorby, vice president, Geo. D. Roper Corp. Stressing the importance of meeting competitive conditions, Mr. Sorby spoke on gas versus electricity in the kitchen.

American-Standard

The American Radiator & Standard Sanitary Corp. has introduced a new feature called Room of the Month Ideas. The first in a monthly series of booklets has been issued to help architects, builders, and heating and plumbing contractors develop additional business. Each month the booklet will illustrate in full color a different room, taken from current American-Standard advertisements, and will explain special features of design and construction that can be employed.

The March booklet, featuring an ultra-modern bathroom, was issued in an attractive standard file folder in which a file of succeeding issues may be kept.

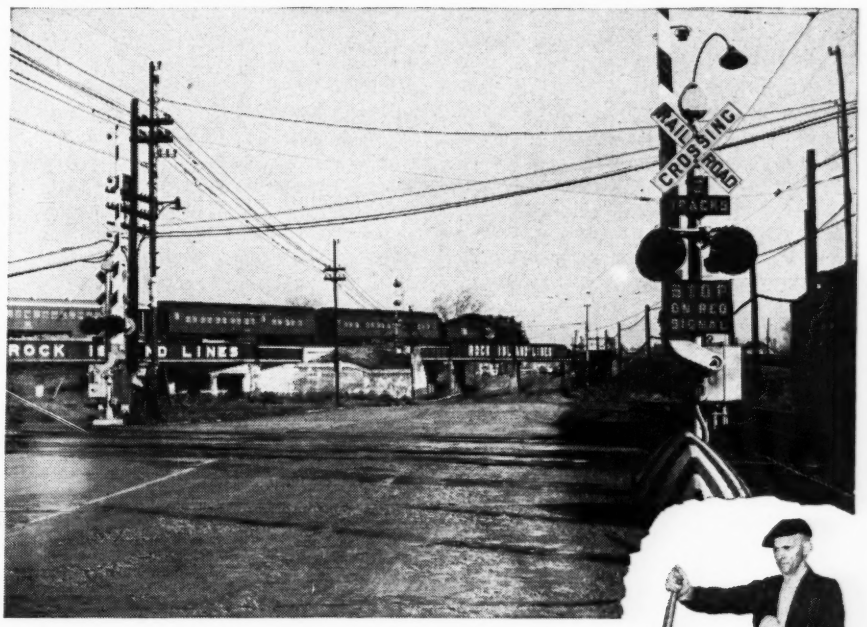
Stewart-Warner Corp.

"South Wind Sealed Heat" is the title of a leaflet recently issued by the South Wind division, outlining the principles of its new home heating unit. This consumer booklet is available for free distribution from the public relations department at 1514 Drover St., Indianapolis, Ind.

Tappan Stove Co.

The advantages of LP-Gas as compared with other fuels are discussed in Tappan's new LP-Gas Sales Maker. The very attractively printed, color booklet is called the "Key to Kitchen Freedom" by the company. Every page contains one or more illustrations.

PROBLEM: LAYING PIPE UNDER THIS BUSY INTERSECTION WITHOUT STOPPING TRAFFIC, DAMAGING STREET . . .



SOLUTION:

PIPE QUICKLY PUSHED UNDER STREET WITH GREENLEE HYDRAULIC PIPE PUSHER . . . . . .

Yes, the Signal Department of the Chicago Division, Rock Island Lines, speeds and simplifies under-street installations of heavy duty electric conduit with a GREENLEE Pipe Pusher. No need to tear up streets, dig long trenches, backfill, repair and restore streets to their former condition.

Think of the savings this means. As reported by Rock Island Lines' Signal Engineer C. R. Swenson, "I would say that at the very least, the Greenlee Pipe Pusher cuts our costs for laying pipe under street crossings to one-third that of the trenching method. That Pipe Pusher repaid its cost long ago."

You too can make important savings with this equipment : : : install pipe easier, faster, better. With the GREENLEE Pipe Pusher *one man* pushes pipe through the ground : : : *under* streets, sidewalks, lawns, flooring, tracks and other obstacles. Get facts now on this timesaving GREENLEE Pusher which often pays for itself on first few jobs.

TOOLS FOR CRAFTSMEN
GREENLEE

Send for complete information now on GREENLEE Hydraulic Pipe Pushers.
Greenlee Tool Co., Division of Greenlee Bros. & Co., 1944 Columbia Avenue, Rockford, Illinois

PIPE LINE NEWS

FPC Allocates Output Of "Inch" Lines Gas

On March 7 the Federal Power Commission announced a new allocation of gas from the Big and Little Big Inch pipe lines, to be effective March 8, 1947, and to continue through April 30, 1947. The commission incorporated into its action the unanimous recommendation of its Industry Advisory Committee on Allocation of Natural Gas.

The committee recommended that Panhandle Eastern Pipe Line Co. receive 20 MMcf daily and that 10 MMcf per day be available to the commission for prompt and fixed allocation during March and April, and that the balance of deliveries be allocated on the following basis: Columbia Gas & Electric Corp., 47%; Consolidated Natural Gas Co., 33%; National Fuel Gas Co., 10%; and Equitable Gas Co., 10%.

The committee also recommended that in allocating the reserved 10 MMcf per day, the commission should give special consideration to the requirements of Equitable and National. The FPC, accordingly, allocated the 10 MMcf as follows: Equitable, 5 MMcf daily; National, 3.5; and Carnegie Natural Gas Co., 1.5.

On the basis of an expected movement through the lines of about 130 MMcf per day during March and April, the new allocation provides: Panhandle, 20 MMcf per day; Columbia, 47; Consolidated, 33; National, 13.5; Equitable, 15; and Carnegie, 1.5.

The lines, which are being operated on an emergency basis by Tennessee Gas & Transmission Co., under a temporary FPC certificate, will be taken over on April 30 by Texas Eastern Transmission Corp.

Northern Natural

The Northern Natural Gas Co., Omaha, Nebr., has requested authority from the FPC to construct facilities to increase its pipe line capacity to 580 MMcf daily to enable it to meet increasing firm gas needs in markets north of its Clifton, Kan., compressor station. Total cost has been estimated at $24.5 million.

Facilities proposed include construction of a new compressor station with installed capacity of 10,000 hp. near Garden City, Kan., and 320 miles of 26-in. line extending from the new station to Palmyra, Nebr.; 245 miles of 24-in. line to complete the existing partial line looping from Palmyra to Farmington, Minn.; 17.3 miles of 20-in. line from Palmyra to a point in Saunders county, Nebr.; the installation of units delivering an aggregate of 8200-hp in existing compressor stations along the line; a dehydration plant and appurtenant equipment.

The company plans to begin construction as soon as materials and supplies are available and contracts made.

Columbia Gas & Electric

Columbia Gas & Electric Corp.'s Charleston and Pittsburgh Groups have filed with the FPC applications for authority to construct additional facilities to supply estimated increased requirements in existing markets served by the Columbia companies, including Washington Gas Light Co., The Manufacturers Light and Heat Co., and Home Gas Co. Total cost of the proposed facilities has been estimated at $25,492,040.

One of the LARGEST GAS PLANTS in the UNITED STATES now Being Wrecked:

AVAILABLE for IMMEDIATE DELIVERY

Entire generator plant now being dismantled—material must be sold immediately. Send us a list of your needs—prices are RIGHT!

GATE VALVES

All types and all sizes of gate valves, 18", 20", 30", 36" and 42".

PIPE

Pipe of all description from ½" to 42".

SCRUBBERS (OIL, WATER)

6—15' x 60', riveted steel plate shell.

5—20' x 60', riveted steel plate shell.

EXHAUSTERS

2—"Ingersoll - Rand," turbo compressor, 3300 RPM, disch. press No. 2.5 lb. sq. in., capacity 16,700 cu. ft./min. at 14.7 lbs.
DRIVEN BY: 275 HP "Terry" steam turbine, 3300 RPM.
1—"Roots" style No. 7, 16" suction and disch., capacity 93,600 cu. ft./hr., 120 RPM.
DRIVEN BY: "Oil City" 20 HP sgl. cyl., vertical steam engine, size 9" x 9".

BLOWERS

3—Steam turbine driven "Sturtevants," 27,800 cu. ft./min., 250 HP "DeLaval" steam turbine, 5500 RPM, including reduction gears.
3—"Sturtevants," 35M to 40 M cu. ft./min.
2 POWERED BY: "DeLaval" 4-stage steam turbine, 300 HP including reduction gears.
1 POWERED BY: 400 HP 8 ∅, 60 cycle, 2300V, 1800 RPM "Fairbanks-Morse" motor, with starters, etc.

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Plans include construction by Atlantic Seaboard Corp. and Virginia Gas Transmission Corp., members of the Charleston Group, of a 268-mile, 24-in. line from United Fuel Gas Co.'s Cobb, W. Va., compressor station to a point near Rockville, Md., and construction by Manufacturers Light and Heat and Home Gas of a 130-mile, 14-in. line from Coatesville, Pa., to Port Jervis, N. Y.

In addition, Atlantic proposes construction of a 3200-hp compressor station on its main line in the vicinity of Flat Top, W. Va., a Potomac river crossing and installation of measuring and regulating equipment. Virginia Transmission would install two additional 800-hp compressor units in Albemarle county, Va.

Trans-Continental

Claude A. Williams, president, Trans-Continental Gas Pipe Line Co., Inc., Longview, Texas, in renewing his company's application to build a $130 million, 1380-mile line from Texas to New York, asserted that he believes distributors in eastern metropolitan areas prefer to wait until a new line can be built if gas can be delivered to them at a lower rate. He claims his company could deliver 325 MMcf. proposed capacity of the line, to the Philadelphia-New York area at 22½ cents per Mcf, 5½ cents cheaper than gas from the Big and Little Big Inch lines.

Trans-Continental proposes to finance privately the entire cost of the 26-in. line. Construction would begin within 90 days after the application is granted and be completed in 18 months or less, the application declares.

Tennessee Gas

Hearing was set by the FPC for March 31 on an application filed by Tennessee Gas and Transmission Co. for authorization to construct facilities to increase the delivery capacity of its pipe line system to 600 MMcf daily. Facilities requested include about 552 miles of 26-in., 69 miles of 24-in. and 82 miles of 20-in. loop line extending along the company's main line; an aerial suspension crossing over the Mississippi river; other river crossings where necessary; approximately 83 miles of 20-in. line from Natchitoches parish, La., to the Carthage field in Texas and various lateral lines; a new compressor station of 6000 hp located in Nueces county, Texas; and compressor units totaling 75,400 hp in existing stations. Total cost has been estimated at $53 million.

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ANSUL CHEMICAL COMPANY
FIRE EXTINGUISHER DIVISION, MARINETTE, WISCONSIN

CURRENT READING

Source and Purification of Gas Supply—L. L. McWilliams. "Oil Weekly," Nov. 25, 1946, pp. 38-40, 42. This paper covers the types and source of gas for injection. It lists the undesirable gases which sometimes occur in the injection media, and describes the difficulties these undesirable gases will cause. The paper outlines the methods of testing for the undesirable gases and the present known methods to purify by eliminating or reducing the difficulties encountered. Finally, the report deals generally with the economics of purification. An API paper.

Identification of Sulfur Compounds in Gas Mixtures—C. S. Oldach and E. Field. "Industrial and Engineering Chemistry," Nov., 1946, pp. 669-672. A sensitive method for identification and quantitative determination of sulfur compounds present in gas mixtures depends on differences in solubility of the sulfur compounds in an inert solvent. A complete analysis usually involves both an absorption and a stripping run in a multiple-plate separator. The total sulfur content of the gas leaving the saturator is plotted against gas volume. A stepwise curve results, wherein the gas volume at which the sulfur content changes abruptly is characteristic of a specific sulfur compound and the magnitude of the change is a measure of the concentration of that compound. As yet an exhaustive evaluation of the method to determine its accuracy has not been made, but identification runs on partially purified manufactured gas and coke-oven gas are presented, the results of which are in general agreement with previous industrial experience.

Determination of Hydrogen Sulfide in Gases—E. Field and C. S. Oldach. "Industrial and Engineering Chemistry," Annual Edition, Nov. 1946, pp. 665-667. Two colorimetric methods have been developed for the analysis of traces of hydrogen sulfide in gases. The hydrogen sulfide is first absorbed in a caustic solution, and in the more sensitive method is converted to bismuth sulfide. The concentration of the resulting suspension is determined by means of a spectrophotometric measurement. In the absence of a spectrophotometer the sulfide is made to react with a uranyl-cadmium reagent and analyzed by visual comparison in a chromometer. With the spectrophotometric method as little as seven micrograms of hydrogen sulfide may be determined with a precision of ± 10%. For larger samples the precision improves to ± 3%. The chromometer technique requires five times as much sulfide for equal precision, but still is far more sensitive than titration.

Carbon Black Manufacturing — J. F. Gallie. "Petroleum Processing," Nov., 1946, pp. 197, etc. The manufacture of carbon black, especially by the newer furnace methods, has climbed steeply during the war years to all-time highs as shown in a graph. Channel, thermal, and various furnace methods of carbon black production are described and analyzed with respect to both quantity and quality of yields. Although the homologous methane series takes first rank as a raw material, methods have been devised for using olefins, diolefins, acetylene and anthracene. In his concluding section, the author discusses the economics of using natural gas as a raw material for carbon black manufacture, and takes issue with the view that it is more important to make higher priced products (e.g., plastics and synthetic rubber) from natural gas than it is to make cheaper products (e.g., carbon black).

South Texas — C. J. Deegan and N. Williams. "Oil and Gas Journal," Nov. 9, 1946, pp. 60-64. With potentially proved reserves of from 1¼ to 1¾ billion bbls. of oil, 300 to 400 million bbls. of condensate, and from 10 to 15 trillion cu. ft. of gas, a line of fields along the Vicksburg Flexure in South Texas appears to be merging into a single large producing area from 45 to 50 miles long and from 3 to 7 miles wide. High spots in the development and linking of these fields, and some of the major engineering and geological problems involved in their operation are presented in this article.

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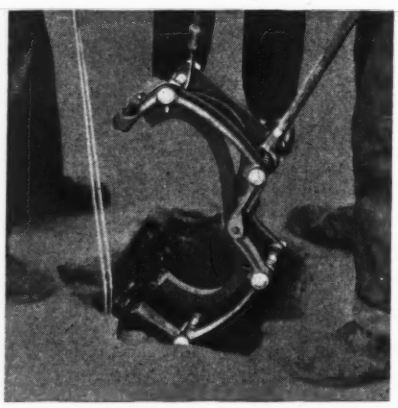
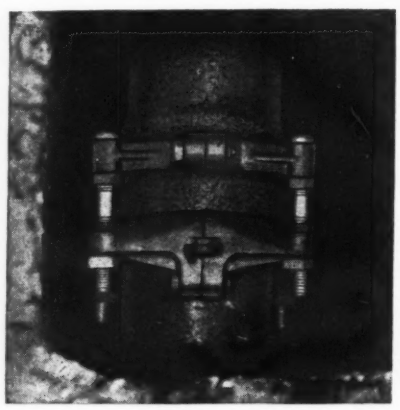
6 inch NORMAC clamp being lowered into hole for installation



6 inch NORMAC clamp in service after installation



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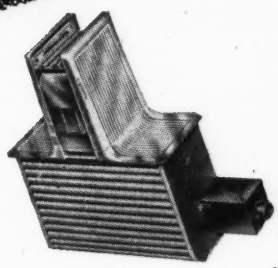

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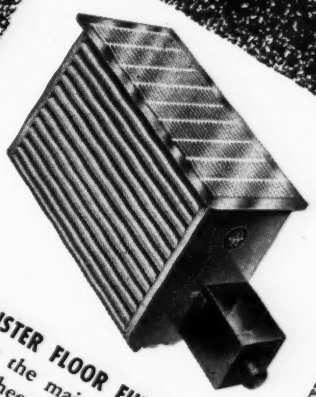

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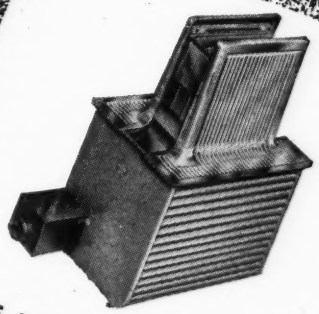
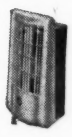


SPACE SAVER WALL FURNACE . . . Newly designed grille uses only 9½ inches of floor space . . . and heats rooms on both sides of the wall. Its compact design makes it ideal for homes where floor space is limited.



Here are two other great Rheem gas heating appliances. The handy gas wall heater brings quick, radiant heat to bathrooms and other small rooms. The Rheem gas console heater is the easy answer to heating spare rooms, workshops or cellar playrooms. Both A.G.A. approved.

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CURRENT READING

Gas Condensate Reservoirs—A Review—O. F. Thornton. "Oil Weekly," Nov. 18, 1946, pp. 42, etc. Ten years of operation of gas-condensate reservoirs has verified the necessity and practicability of cooperative and unitized operation. Three types of gas condensates now are recognized: wet - gas, retrograde - gas, and reservoir liquid. The operating method for each reservoir should be based upon the characteristics of the gas condensate at reservoir conditions. Other factors such as richness of the gas, size of the reserve, capacities of wells, nature of the reservoir, and mode of occurrence of the gas condensate must be considered. Marketing conditions, tax position, and other factors also are important. Due to the increasing volume of the gas market, and prospects for chemical conversion of the gas to liquid fuel by the Fischer-Tropsch process, many operators will be required to make a choice or compromise between complete pressure maintenance and gas sales. This can be done intelligently with known methods of evaluation. An API paper.

Tank Ventilation — O. W. Johnson. "Petroleum Engineer," Nov., 1946, pp. 96, 98. Removal of residual vapor from any tank that has contained a volatile oil is an important step in conditioning the tank for entry for inspection, cleaning, or repairs. The process is commonly referred to as "gas freeing," although the essential element in the process is simply to reduce the vapor content of the tank atmosphere to some value that can be breathed without discomfort and without effect on the health of the worker. Steam, flue gas, CO_2 or other similar "inert" gases are sometimes recommended for purging tanks, but in every case it is necessary that final ventilation with air be employed to provide an atmosphere that is safe for men to breathe. This article discusses the application of both air and steam in purging tanks of residual vapor, bringing out important differences in behavior and results obtained. Mechanical problems in connection with the actual removal of solids and liquid tank residues are not covered.

Concise Chemical and Technical Dictionary—Edited by H. Bennett. Published by The Chemical Publishing Co., Inc., 26 Court St., Brooklyn 2, N. Y. This 1120-page dictionary contains 50,000 definitions; conversion tables for weights, measures, temperature, specific gravity, etc.; range and use of indicators; organic ring systems; chemical elements and their discoverers; vitamin values of important foodstuffs; addenda sheets which list the newest trade names and definitions of additional chemical terms; and pronunciation guide. An outstanding feature is an up-to-date compilation of thousands of trade-name or proprietary products in the synthetic resin, plastics, metal, rubber, textile, food, pharmaceutical, paint and varnish fields. Price $10.

Conversion of Organic Sulfur to Hydrogen Sulfide for Analysis—E. Field and C. S. Oldach. "Industrial and Engineering Chemistry," Annual Edition, Nov., 1946, pp. 668, 669. Organic sulfur compounds are quantitatively converted to hydrogen sulfide by passing with hydrogen over alumina at 900° C. The technique has made possible the analysis of traces of organic sulfur compounds in gases or liquids when used in conjunction with sufficiently sensitive methods for hydrogen sulfide analysis.

The Federal Labor Laws, A Manual For Supervisors — National Foremen's Institute, Inc., Deep River, Conn. This loose-leaf, leather-bound manual has been issued in a revised 1947 edition. It can be kept up to the minute, since new sections for it will be issued as legislative changes make them necessary. They will be supplied separately at nominal prices. The manual presents information about federal labor laws which every foreman should know.

Pressure Maintenance Projects on the Increase in Oklahoma—E. G. Dahlgren. "Petroleum World," Nov., 1946, pp. 74-76. Pressure maintenance and such secondary recovery measures as water flooding and pressure restoration through gas injection are gaining momentum in Oklahoma, particularly since the state legislature set up means of organizing and carrying on such projects. A number of the projects are briefly discussed.

Ark.-La.-Tex. Has Good Gas-Conservation Record—G. Weber. "Oil and Gas Journal," Nov. 2, 1946, pp. 82, 83. Gas sales, natural gasoline manufacture, repressuring, pressure maintenance, cycling, and even some chemical manufacture, are being developed more and more to utilize "oil-well gas" in this important area. Some of the current problems and key figures are given in this article.

Five Years of Operation at the Langlie Unitized Repressuring Project—R. L. Gray. "Oil Weekly," Nov. 25, 1946, pp. 32-37. The results of five years of operation under a gas-injection program are summarized. The project known as the Langlie Unitized Repressuring Project is located in southeastern New Mexico. The project was started when the average reservoir pressure was 615 psi (original pressure was estimated as 1400 psi). After five years of injecting gas into two wells, the average pressure had declined to 467 psi in the 13 wells. The average gas-oil ratio at start of injection was 2000 cu. ft. per bbl., and is now about 11,000 cu. ft. per bbl. The greatest operating problem, the channeling of gas, has been solved to a certain extent by controlling injection of gas by packers. It is estimated that recovery by gas injection ultimately will be 43.5% greater than primary operation for injection period, or 14.8% greater for entire life. An API paper.

Tests at Cycling Project Demonstrate Possibilities of New Corrosion Inhibitor—W. H. Justice and E. N. Jones. "Oil and Gas Journal," Nov. 9, 1946, pp. 86, 87, 100. The tests described on the 1 Harris well, Tuleta field, Bee county, Texas, indicate that the inhibitor Kontol 115 reduced the corrosion rate to 7% of the original coupon rate, with the injection of 1.75 qt. of inhibitor into annulus of the well while the tubing was producing at a rate of 4 Mcf of gas per day. The cost of the inhibitor during the test was 87 cents per day or 21 cents per Mcf of gas. The inhibitor exhibits a residual corrosion reduction effect for several days after injection of chemical is discontinued. No evidence was observed to indicate any plugging of the formation or the well tubing. No emulsion troubles have been observed in the cycling plant processing the condensate from this well.

Ranarex Gas Gravitometers, Principle and Operation—J. M. Quirk. Discusses the theoretical and practical aspects and methods of determining specific gravity of a gas. Gives detailed description of the Ranarex gas gravitometer, including auxiliary equipment suitable for special purpose high accuracy operations. Furnishes recommendations for calibration, installation, and service checks at suitable intervals. Stresses the importance of having these instruments serviced by trained instrument men to develop the maximum accuracy and dependability. Available from the Southern California Meter Association, Long Beach 6, Calif. Publication No. 25, paper No. 3.

Pulsation and Its Effect on Flowmeters — E. J. Lindahl. "Transactions," ASME, Nov., 1946, pp. 883-894. Flowmeter readings are apt to be seriously in error if the fluid flowing through the meter is subjected to rapid recurring variations in velocity or pressure, or both. Flow having these variations is thought of as being "pulsating flow." Much thought has been given to pulsating flow or pulsation and much has been written about it. It is the purpose of this article to bring together some of the results which have been obtained.

11,667 Productive Acres Repressured in West Pampa Cooperative Project, Texas Panhandle — K. B. Barnes. "Oil and Gas Journal," Nov. 9, 1946, pp. 66, etc.

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PCGA To Issue Sizing Charts

RESOLUTIONS to reprint the domestic water heater sizing chart and to publish a booklet containing data prepared for sizing commercial installations were passed during a two-day series of sales and appliance council conferences of the Pacific Coast Gas Association, held March 6 and 7 at the Southern California Gas Co., Los Angeles.

Adoption of the resolutions at the meeting of the water heater council highlighted three sessions at which 75 manufacturers and utility salesmen gathered to thrash out problems in merchandising three major home appliances — ranges, heaters, and water heaters.

Based on tests made in Los Angeles and experiments conducted by the A. G.A. in other large cities, the commercial chart data, presented by R. D. MacMahon of the Southern California Gas Co., represented a symposium of results. Graphs showing separate curves derived from the tests were presented in slide form.

Sentiment opposing a nationwide campaign built around the use of the CP slogan prompted adoption of a proposal to submit the council's report to the meeting of the Water Heating Committee of the Residential Gas Section, A.G.A., in Kansas City, Mo., March 13. The report seeks alternate actions, such as strengthening of requirements and tieing in of territorial campaigns in preference to the use of "CP."

Sizing discussion centered about the problem of assuring installation of 30-gal. heaters in new construction, and the replacement of old 20-gal. heaters with new 30-gal. models in preference to replacement with the smaller size.

The all-day meeting of the range and refrigerator council focussed attention on what the utilities are doing to cooperate with dealers. Consensus pointed to continued withdrawal of utilities from retail sales to a point consistent with protection of existing and potential domestic loads.

A lively discussion centered around ways of improving gas ranges, with Gladys Price and Mercedes Bates of the Southern California Gas Co. giving home service representative views.

Members of the heating council discussed production figures, heard a review of minimum standards by A. B. Banowski, Payne Furnace Co., a talk on building codes by H. W. Geyer, Southern Counties Gas Co., and an exposition of a simplified heat loss calculation method by Art Theobald, Payne.

A presentation of the A.G.A. reference manual by J. L. Hall, Southern California Gas, at each session, and a showing of the new Servel refrigerator were other features of the conference.

West Heaviest User Of Natural Gas

Natural gas plays a more important role in satisfying fuel requirements in the West than in any other part of the nation, according to an analysis of the outlook for the petroleum industry in the West, recently completed by the economic and statistical department of Standard of California. In 1945 California alone used more than 21% of the natural gas consumed in the nation for domestic and commercial purposes.

The states of California, Oregon, Washington, Arizona and Nevada comprise less than 10% of the country's population, but they account for 19% of all domestic petroleum consumption. Wartime migration to the Pacific Coast brought the population of these five states in mid-1946 to about 13.4 million, a gain of around 30% since 1940.

Your MORE Customers MORE

DEMAND MORE

Now is the time to convert your city gas distribution system to LP-GAS—for more dependable, more profitable operation. LP-GAS is your guarantee of uniform, uninterrupted, efficient service to meet the fuel demands of your customers.

Like the utilities, the manufacturers of LP-GAS have winter peak load periods, too. Plan now to stock your winter's LP-GAS supply this summer when the demand is lighter and supply and delivery are available.

Many utility gas companies are including WARREN'S broad experience, engineering advice and consultation service in planning to convert their operations to LP-GAS.

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TABLE 1.—ESTIMATED PROVED RECOVERABLE RESERVES OF NATURAL GAS IN THE UNITED STATES

(Millions of Cubic Feet)

	RESERVES AS OF DEC. 31, 1945	CHANGES IN RESERVES DURING 1946			RESERVES AS OF DEC. 31, 1946			
		Discoveries, Extensions and Revisions	Net Production	Net Increase	TOTAL	Non-Associated	Associated	Dissolved
Alabama	23	75	1	74	97	0	0	97
Arkansas	869,686	54,171	52,195	1,976	871,662	447,651	162,276	261,735
California	10,855,707	803,056	532,462	270,594	11,126,301	3,687,430	3,198,714	4,240,157
Colorado	396,282	(—) 70,905	9,614	(—) 80,519	315,763	155,440	41,075	119,248
Illinois	268,000	33,500	33,500	0	268,000	3,000	55,000	210,000
Indiana	17,000	3,200	3,200	0	17,000	4,000	8,000	5,000
Kansas	13,250,605	636,771	206,532	430,239	13,680,844	13,257,617	212,310	210,917
Kentucky	1,436,800	44,200	95,000	(—) 50,800	1,386,000	1,299,000	0	87,000
Louisiana	19,849,393	3,170,050	607,932	2,562,118	22,411,511	18,323,314	2,697,126	1,391,071
Michigan	8,931	148,069	26,000	122,069	131,000	76,200	0	54,800
Mississippi	2,007,859	383,842	21,188	362,654	2,370,513	1,731,821	446,098	192,594
Montana	1,202,521	(—) 319,521	29,599	(—) 349,120	853,401	853,401	0	0
Nebraska	375	(—) 374	0	(—) 374	1	0	0	1
New Mexico	5,190,309	899,737	185,260	714,477	5,904,786	3,079,900	2,132,911	691,975
New York	76,000	900	7,000	(—) 6,100	69,900	69,000	0	900
Ohio	626,800	46,200	59,000	(—) 12,800	614,000	573,000	0	41,000
Oklahoma	10,079,938	1,311,816	655,908	655,908	10,735,845	7,572,279	1,589,538	1,574,028
Pennsylvania	520,000	61,000	78,000	(—) 17,000	503,000	453,000	0	50,000
Texas	78,306,676	10,154,021	2,097,238	8,056,783	86,363,549	62,345,192	15,282,025	8,736,242
West Virginia	1,928,300	116,700	205,000	(—) 88,300	1,840,000	1,739,000	0	101,000
Wyoming	816,763	252,379	33,545	218,834	1,035,597	693,191	235,176	107,230
Miscellaneous*	81,399	265	4,443	(—) 4,178	77,221	76,900	0	321
TOTAL	147,789,367	17,729,152	4,942,617	12,786,535	160,575,901	116,440,336	26,060,249	18,075,316

* Includes Florida, Missouri and Utah.
Volumes are reported at a pressure base of 14.65 psia, and at a standard temperature of 60° F.
Net production equals estimated gross withdrawals, less gas reinjected into underground reservoirs.
Reserves of *dissolved* gas were estimated jointly with the API Committee on Petroleum Reserves.

A.G.A. COMMITTEE REPORTS

Proved Reserves Now Total 160 Trillion

THE American Gas Association's Committee on Natural Gas Reserves estimates that the proved recoverable reserves of natural gas in the United States as of Dec. 31, 1946, approximated 160 trillion cu. ft., classified as follows:

1. **Non-associated gas (free gas not in contact with crude oil in the reservoir)....116 trillion cu. ft.**
2. **Associated gas (free gas in contact with crude oil in the reservoir)....26 trillion cu. ft.**
3. **Dissolved gas (gas in solution in crude oil in the reservoir)....18 trillion cu. ft.**

All volumes have been calculated at a pressure base of 14.65 psia, and at a temperature of 60° F. The estimate is detailed by states in *Table 1*. The increase over the committee's previous estimate for Dec. 31, 1945, is accounted for as follows:

Total proved reserves as of Dec. 31, 1495	**148**
Revisions, extensions and discoveries, 1946	**17**
Less production during 1946	**5**
Net increase in reserves during 1946	**12**
Estimated proved reserves as of Dec. 31, 1946	**160**

The Committee on Petroleum Reserves of the American Petroleum Institute, of which Frederic H. Lahee is chairman, has cooperated in the study and preparation of these estimates of reserves. The estimates of that portion of the natural gas reserves classified as dissolved gas were contributed to a large extent by that group, who also collaborated generously in the estimates of natural gas liquids.

Natural Gas Liquids

Both committees agreed to use the term "natural gas liquids" to describe those hydrocarbon liquids that are gaseous in the reservoir but are obtainable by condensation or absorption. Natural gasoline, condensate, and liquefied petroleum gases fall in this category. The proved recoverable reserves of natural gas liquids in the United States are estimated, as of Dec. 31, 1946, to be 3321 million barrels. These reserves are classified in the same manner as the gas from which they are extracted.

1. **Non-associated....1924 million barrels**
2. **Associated....573 million barrels**
3. **Dissolved....824 million barrels**

Proved reserves of natural gas as herein used include the gas in both the drilled and certain undrilled portions of the fields. The undeveloped areas considered to have proved reserves are those so located with respect to the field geology and structure that production therefrom is practically assured. Recoverable reserves of natural gas are the reserves estimated to be producible under existing operating practices. The recovery factors or abandonment pressures used differ as widely as the characteristics of each field and the economics of each region.

Proved recoverable reserves of natural gas liquids are those estimated to be contained in recoverable gas reserves and to be extractable by methods now in use.

Penn Body To Rule On New Business

ON the heels of a meeting called by the Federal Power Commission in Washington, at which representatives of state utility commissions met to decide how to tackle the problem of natural gas shortages, the Pennsylvania Public Utility Commission announced a new regulation to control the adoption of natural gas heating by new customers of the three companies serving the Greater Pittsburgh area—Peoples Natural Gas Co., Manufacturers Light and Heat Co., and Equitable Gas Co.

The order became effective March 1.

According to terms of the regulation, all persons anticipating installation of natural gas for heating purposes must now file written applications. Customers who fail to observe the ruling will be penalized by a complete gas shutoff on 10 days' notice, with suspension of service to continue until the order has been observed.

Under the ruling, medical cases will receive top priority, with second ranking going to new structures equipment designed to use gas—such as boilers, furnaces, and unit heaters.

The ruling was necessitated by a 6 billion cu. ft. per year increase in consumption from 1943 to 1946. Typical of the trend were Dec. 17, 1945, when 269,177 Mcf was sent out, and Feb. 5, 1946—a day on which temperatures were comparable—when consumption reached 406,944 Mcf.

Meanwhile, the FPC meeting had uncovered the following sentiments: that the steel shortage presented the greatest difficulty, and that greater pipe allocation was mandatory; that use of standby equipment should be redoubled; that old customers be served before new customers were added.

Further meetings were contemplated.

Hidden Leakage Means Hidden Loss

prevent it three ways with "Carboseal" Anti-Leak

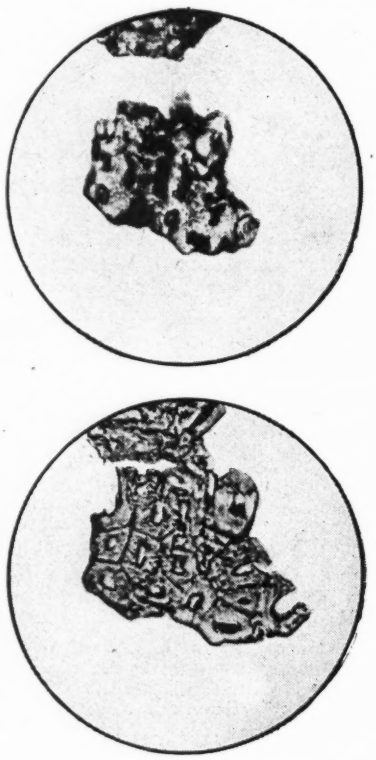
"Carboseal" anti-leak is a specially developed compound which works *three ways* to cut losses in dry-gas distribution systems:

It efficiently and economically swells the jute fibers in bell-and-spigot joints and makes them gas-tight—cuts hidden losses of gas up to 100 per cent.

Rust and dirt in mains is saturated and kept in place by the "Carboseal" treatment — thus eliminating many service calls due to pilot outages.

"Carboseal" contains an inhibitor which cuts down maintenance costs due to corrosion.

A 20-page booklet tells more about "Carboseal" anti-leak treatment—how it is applied, what equipment is needed, how much typical treatments cost, and the results that can be obtained. A copy of this book is yours for the asking.



The photomicrographs above illustrate the tremendous increase in volume when dried-out jute fibers are treated with "Carboseal" anti-leak. The photograph at top shows a cross section of dry jute fiber—the photo at bottom shows the same fiber after treatment with "Carboseal" anti-leak. The fiber has increased 44 per cent in volume and will maintain that volume indefinitely. "Carboseal" anti-leak will do the same for the jute packing in bell-and-spigot joints in your dry-gas system.

CARBOSEAL ANTI-LEAK

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Unit of Union Carbide and Carbon Corporation
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The word "Carboseal" is a registered trade-mark of Carbide and Carbon Chemicals Corporation.

Royalty Men Insist on 7-Cent Well-Head Price

Members of the Texas county (Oklahoma) Land and Royalty Owners Association in recent sectional meetings, have agreed to refuse to accept any checks for gas royalties that are not based on the 7-cent well-head price fixed by the Oklahoma Corporation Commission last December.

Prevailing price of gas in the field is still 4 cents per Mcf. The 7-cent price fixed by the order of the commission is suspended under supersedeas bonds while the case is pending on appeal to the Oklahoma Supreme Court.

The royalty owners object not only to the price but to the measurement base of 16.40 psi which has long prevailed in the field, and insist on the 14.65 psi base which was fixed by the corporation commission and is still withheld from operation under the supersedeas proceedings. The gas companies involved will be required to pay for all gas on the corporation commission price and measurement basis if the commission order is upheld.

Editors' Contest

Winners of the Second Annual Publications Contest, sponsored by the Wisconsin Regional Association of the International Council of Industrial Editors, will be announced at the council's annual convention in St. Louis, May 15 and 16. Deadline for entries is April 25.

Editors of all company magazines and newspapers published in the United States and Canada have been invited to participate in the contest. Entry blanks and detailed contest information may be obtained from Joseph A. Dragotto, P.O. Box 404, Milwaukee, Wis.

Oklahoma Court Backs Ratable Take Order

THE Oklahoma Supreme Court, in a recent decision, fully upheld the authority of the Oklahoma Corporation Commission to enforce ratable taking of natural gas from a source of common supply in a gas field. It also held that the 1913 ratable taking law, which is the basic conservation act of Oklahoma, was not repealed by nor in conflict with the 1915 act prohibiting waste of natural gas.

The decision was made in connection with the case of the Republic Natural Gas Co. vs. the State of Oklahoma and the Peerless Oil & Gas Co. The court upheld an order of the corporation commission which required Republic Natural Gas Co. to take gas ratably from a well of Peerless Oil and Gas, producing from the same source of supply, or to cease the production of gas from that source of supply from its own wells.

The commission found that Republic had drilled numerous wells in the Hugoton gas field; had constructed pipe lines from these wells to its main pipe line which extends some 25 or 30 miles to a connection in Kansas, where it sold its gas to a common purchaser and common carrier of gas; and sold a part of its gas to the Cities Service Gas Co. at a point within Oklahoma. It was further found that one of the Republic gathering lines ran across land in Texas county, Oklahoma, upon which the Peerless Oil and Gas Co. well was drilled and that Republic had several wells on adjoining leases which were draining gas from under the land covered by the Peerless lease.

The commission also found that the production of gas in the Hugoton field was in excess of market demand; and that Republic was a common purchaser and a common carrier of natural gas in Hugoton field, and was taking gas not for the purpose of developing an oil or gas field, or operating oil wells, or for the purpose of its own domestic use, and therefore was subject to the provisions of the 1913 statute requiring it to take ratably from Peerless.

Tennessee Joins Compact

Earl Foster, secretary, Interstate Oil Compact Commission, announced March 1 that Governor Jim Nance McCord had signed a bill making Tennessee the eighteenth member-state of the compact.

The Interstate Oil Compact Commission is a voluntary association of oil and gas producing states organized in 1935 for the purpose of furthering sound oil and gas conservation principles and preventing waste of these natural resources.

Starting with six states, the commission has expanded until it now embraces states which produce more than 90% of the nation's gas and 80% of the crude oil.

New Servel Outlet

Gas Appliance, Inc., 1313 East 6th St., Los Angeles, is a newly organized company which will distribute Servel gas refrigerators to dealers in Southern California. Servels have been handled in the area by Southern California Gas and Southern Counties Gas Co.'s since they came on the market in the early 30's.

C. A. Miller, former Pacific Coast regional manager of Servel, Inc., heads the new company. He will be assisted by E. J. Strickland, formerly of the Southern California Gas Co.

The change in distributorship became effective Feb. 24, In the future. only Southern California Gas, Southern Counties Gas, and downtown Los Angeles department stores will purchase refrigerators direct from Servel.

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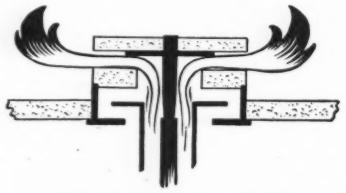

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Texas Eastern May Extend Inch Lines

Texas Eastern Transmission Corp., successful bidder on the Big and Little Inch pipe lines, may extend the lines to serve a new market. The company's purchase proposal, recently made public by WAA, reported that its $182 million capitalization is based on selling gas at the Philadelphia-New Jersey and Appalachian termini.

The report added: "The company may determine that it is economically desirable to market a portion of its gas in the metropolitan New York areas east of the Hudson River, in the New England area or in the Baltimore area." Any of these areas could absorb the entire 425 MMcf daily capacity of the lines, it was stated.

If an extension to Baltimore is decided upon, a 60-mile 20-in. lateral line would be built from a point near Harrisburg, Pa. It would cost $3.3 million and would deliver 160 MMcf daily.

Chicagoland Home Show Scheduled For May 17-25

The most up-to-date building materials, home equipment and furnishings will be on display at the Chicagoland Home Show to be held at the Coliseum May 17-25, according to Paul S. Van Auken, managing director. The show is sponsored by the Chicago Metropolitan Home Builders Association.

Over 200,000 persons from the Chicago area are expected to view the many new home products. A model home, built especially for the show, will include modern furnishings and services and will be gauged to the needs and means of young homeseekers.

A staff of architects and home experts will conduct discussions at a number of clinics on such subjects as site selection, equipment and furnishings.

Pittsburgh Equitable Now Producing Steel Meters

As a service to tin meters users, the Pittsburgh Equitable Meter Division of Rockwell Manufacturing Co. has started volume production of types 5-150 and 5-200 sheet steel gas meters protected with copper cladding. Manufacture of tin meters has been severely hampered due to curtailments on production of heavy gauge meter plate.

The copper clad metal used is considered superior to tin plate for meter construction, according to the manufacturer. The thick coating of copper eliminates porosity troubles common to plated materials, and rust is stopped in its inception. Copper clad sheets cut, form and draw as readily as low carbon steel.

Gas Consumption High

Utilities Director Alex Speer of St. Petersburg, Fla., on March 7 announced unofficial figures for the consumption of gas during the month of February which showed a total of 133,460 Mcf used by city residents in the 28-day period. Speer said the "incredibly high" consumption figures showed an increase of 40% over the same month a year ago, and exceeded the previous record established in December, 1945, by 28,000 Mcf. He attributed the unprecedented gas use to an increase in population and extended cold weather.

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STREET CITY ZONE STATE

San Antonio Gas Rates Reduced Five Cents

As of March 1, the citizenry of San Antonio, Texas, received a reduction of five cents per Mcf in their general service gas rate as a result of a new contract signed by the city Public Service Board with United Gas Pipe Line Co. Gas for general service use will be supplied to the city at 17 cents per Mcf under the new contract which runs for 15 years. The price under the old contract was 22 cents per Mcf. The new price gives San Antonio a lower rate than is in force in any of the other large cities of the state.

The contract calls for the building of a 20-in. supply line, costing about $4.7 million, to augment the present three-line system serving the city. The line, to be completed by 1950, will consist of a 16-in. loop which will circle the city, and a 20-in. line extending south to the various gas fields.

Electric Utilities Increase Gas Use and Energy Output

According to reports issued on March 7 by the FPC, electric utility power plants consumed 21,899,151 Mcf of gas in January, 1947, an increase of 2% over the previous month and 14.3% above the corresponding month in 1946. Gas consumption was 21,845,001 Mcf during December and 19,158,490 Mcf in January, 1946.

Production of electric energy for public use during last January totaled 21,636,260 kwh, an increase of 17.6% over January, 1946, and the highest monthly production on record. Combined utilities and industrial production increased 17.1% over January, 1946.

Indianapolis Peak Supply Shortage To Continue

The shortage of natural gas in Indianapolis, Ind., cannot be overcome short of a year and a half, according to General Manager Thomas L. Kemp of the Citizens Gas & Coke Utility. The statement was issued to discount rumors that Panhandle Eastern Pipe Line Co. had given assurance that Texas gas would be available to the Indiana city by May or June.

The city has been seeking a supply of natural gas to augment the utility's supply of manufactured gas during the cold months.

ENGINEER WANTED

"Engineer" preferably not over 40, for development design and testing of gasfired residential heating equipment. Should have experience with manufacturer of such equipment. Location East, steady employment with well-known manufacturer."

BOX 50, GAS
1709 W. 8th St., Los Angeles 14, Calif.

GAS ENGINEER

Major Pacific Coast Gas Range manufacturer desires to obtain for a permanent position, a graduate engineer experienced in gas range design, combustion practices and familiar with A.G.A. Laboratory testing procedures. Give complete details as to personal qualifications, age, experience, education, references, etc.

BOX 100, GAS
1709 W. 8th St., Los Angeles 14, Calif.

Texas Co. Establishes Fellowship At Purdue

The Texas Co. is establishing an industrial fellowship at Purdue University for study of mass transfer and heat transfer in refining and chemical processes, Dr. G. Stanley Meikle, Director of Purdue's Research Foundation, revealed.

The fellowship results from the growing importance of processes in which reactants in the gas phase are contacted with a solid catalyst and the need for basic data necessary for the design of equipment for these processes.

It is hoped that the fellowship will provide this engineering data and make possible the design of more effective and economical equipment.

Wheelco Joins Ether To Serve British Market

The Wheelco Instruments Co., Chicago maker of electronic instruments for measurement and control of industrial processes, recently completed arrangements whereby Wheelco instruments will be manufactured and marketed throughout the United Kingdom by Ether, Ltd., Birmingham, England.

The new line will be a combination of standard Wheelco models operating electronically together with Ether-made indicating, recording, optical and radiation pyrometers, servo mechanisms and electrically and hydraulically operated valve gears.

Gas Employees Decline Union Affiliation

Employees of the McKamie Gas Cleaning Co.'s plant in eastern Lafayette county, Ark., voted in an election held early in March by the National Labor Relations Board, against affiliation with the International Union of Operating Engineers (AFL). The vote was 18 against affiliation and 14 for it.

The gas cleaning plant is operated to clean sour gas and remove chemical content which obstructs its use as industrial fuel.

Gas Shutdown Retards Studebaker Production

Studebaker Corp., South Bend, Ind., has reported that output of passenger cars and trucks during the 20 working days of February was reduced by the gas emergency shutdown of Feb. 5. The company produced 14,958 cars and trucks during the month, according to H. S. Vance, chairman. The total was lower than in December and January, although there were 21 and 22 operating days, respectively, in those months.

Bids Asked for Natural Gas To Mix With Manufactured

The Citizens Gas & Coke Utility of Indianapolis, Ind., as its first step in a $1 million program to bring more gas supplies to the city through purchase of natural gas to mix with its own manufactured gas, has sent out requests for bids (for the supply of natural gas) to Texas Eastern Transmission Co., Kentucky Natural Gas Co., Michigan-Wisconsin Pipe Line Co., Natural Gas Pipeline Co. of America, Panhandle Eastern Pipe Line Co., and Tennessee Gas & Transmission Co.

The utility also advertised in Indianapolis newspapers for bidders. The bids will be opened at the company's offices at noon on May 10. First delivery is wanted by July 1, 1948, and the contract, which is to run for 20 years, is expected to be awarded by June 10.

Regardless of which company wins the contract, the lines will be brought only to the Marion county line, from which point the Indianapolis utility will lay its own lines. The company will also erect a mixing plant where the natural and manufactured gas will be mixed.

The invitation to bid specifies a minimum daily supply of 7 MMcf in 1949, a maximum of 27.4, and an average of 10.9 MMcf. By 1956 the minimum would be 7.98, the maximum 39.9, and the average 14 MMcf.

Brooklyn Union Men Hold Meter Reading Titles

Two Brooklyn (N. Y.) Union Gas Co. meter readers, George P. Woll and Charles V. Dillon, have added another year to their record of errorless meter reading, bringing to seven the number of years they have held national championships for perfect meter reading. Woll, national champion in number of consecutive non-error readings, has a total of 1,406,082 and just completed his 13th successive year of perfect reading. Dillon, who completed his 17th year on Dec. 31, is national titleholder in years of no-error reading. He has made 982,-977 perfect readings.

Nineteen of the company's other meter readers completed 1946 without an error.

CLEVELANDS are engineered and built to fit the GAS trenching job

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Ask any man who operates a CLEVELAND why he likes them—Swears By Them.

He'll probably tell you first about the ease of operation due to the operator visibility, convenience of the controls and the quick sure handling, thru brake steering and full crawler tracks. Then he'll certainly mention the fine balance and surefootedness of the machine that enables him to confidently travel the most rugged terrain. He'll talk enthusiastically about the ample power for the toughest digging and the wide range of transmission controlled speeds that make it possible to use just the right speed for the work in hand.

He'll mention, of course, the sturdy, compact, all-welded construction of CLEVELANDS that assures their going for long periods with only a minimum of even minor repairs and the fact that when field repairs are necessary they are made with minimum loss of time because of CLEVELAND's accessible unit type construction.

These, plus low fuel and lubricating costs, are some of the reasons he'll explain for his enthusiasm about CLEVELANDS. He'll probably wind up saying that CLEVELANDS are really engineered and built from the ground up for the Gas trenching job as proved by the way they've really put out the trench for him either on long main lines or in the confined areas of cities and suburbs.

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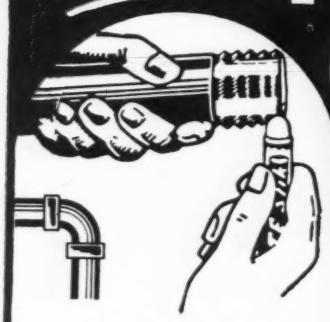

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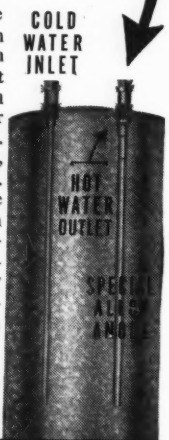

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2310 Superior Ave. Cleveland 14, Ohio

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CPA Amendment Tightens Priority Controls

An amendment to PR-28, issued Feb. 13 by the Office of Temporary Controls, Civilian Production Administration, tightens the issuance of CC priority ratings. The new regulation, effective Feb. 15, now states that CC ratings will be issued only where an essential item is needed in an emergency by the Army, Navy, Maritime Commission, Veterans Administration or Atomic Energy Commission to meet the requirements of their most urgent projects.

CC ratings will also be granted where an item is needed to maintain, at current levels, essential community utility services; or to provide essential utility services to new housing; or where an item is needed in an emergency to eliminate an imminent or existing hazard to the life, health, or safety of a large number of people.

Canadian Gas Water Plant in Operation

Completed at a cost of $250,000, the new carbureted gas water plant of the B. C. Electric Railway Co., Victoria, B. C., has now gone into operation. The unit was built by the John Inglis Co., of Toronto, under the direct supervision of Eric Noble, resident engineer, and Harry Truman, manager of the Victoria company.

W. H. Dreaper, superintendent of Victoria Gas Co., subsidiary of B. C. Electric, states that the unit will double the output for the Victoria plant, giving a total production of 3 MMcf per day. The new unit is completely automatic in operation. All valve movements are performed with hydraulic pressure, using oil at 800 psi.

Synthetic Solvents Plant

A new plant for the production of the synthetic industrial solvents, methyl isobutyl ketone and methyl isobutyl carbinol, is under construction at the Houston, Texas, plant of Shell Chemical Corp. Production of the solvents, now being manufactured by Shell Chemical on the west coast, is scheduled to begin early this summer.

Contractor for construction of the new plant is C. F. Braun and Co. Cost is estimated at $2.2 million, including general plant facilities.

Fluor Wins Safety Award

For the second straight year, The Fluor Corp. Ltd., has been awarded second place in the heavy construction division of the accident prevention contest sponsored annually by the Associated General Contractors of America.

This award was made at the national convention of the association, which was held recently in Chicago. In compiling this outstanding safety record. The Fluor Corp. had a 2.10 severity rate for 4,065,864 man hours of exposure.

Sweet Gas in Carbon Black

A bill to permit use of sweet gas for carbon black manufacture, if the price paid equals that paid for gas used for light and fuel purposes, was approved by a Texas senate committee on March 11. The bill, by Senator Grady Hazelwood, Amarillo, would apply only to the Panhandle field.

Kellogg Traffic Dept. Solves Transport Problems

The current issue of "The Kellogg-gram," house organ published by the M. W. Kellogg Co., petroleum engineers, Jersey City, N.J., describes the unique methods the firm's traffic department has employed in shipping some of the largest and heaviest equipment ever fabricated by American industry to points all over the world.

Among the problems with which the company has been faced are floating 150-ton "steel whales" 2000 miles cross country on inland waterways, sawing off railroad track encumbrances, reinforcing ship decks and building docks.

Passage Unlikely For Washington Power Bill

According to reports early in March, legislators in the state of Washington had almost killed the power inquiry bill, providing for a two-year study of the the state's power problem by a seven-man board and suspending in the interim rights of public utility departments to condemn properties of privately owned utility systems.

The house version of the bill was up for second reading when it was voted down 46 to 40, and members of the senate were quoted as saying there was practically no chance the senate measure would reach the floor.

B. C. Appliance Sales Exceed Peacetime High

According to reports compiled by the B. C. Electric Railway Co. from gas appliance stores on the lower mainland of British Columbia, gas appliance sales during 1946 in Vancouver were higher than in 1939, last year of peacetime production. In 1946, 1843 range sales were recorded, compared with 1296 for the same area in 1939. Eight hundred two automatic water heaters were sold last year, against 786 in 1939. Gas refrigerator sales in 1939 totaled eight, while in 1946, 43 were sold.

Conservation & Tax Bills Introduced In Oklahoma

The first of two amended oil and gas conservation bills, SB 153, has been introduced into the Oklahoma State Senate by the senate oil and gas committee. The bill, introduced Feb. 27, comprises eight sections, defining waste in oil fields and in natural gas production. The corporation commission is given authority to limit production to a percentage of the production capacity of the well, and to make and enforce rules and regulations to prevent waste of gas as well as to protect all fresh water strata and oil or gas-bearing strata encountered in any well drilled for gas. Public hearings will be held on the committee bills before they are acted upon.

Under House Bill No. 236, also introduced Feb. 27, an excise, license or privilege tax of two cents per Mcf is levied upon every person engaged in gathering natural and casinghead gas produced in Oklahoma. It is similar to a bill introduced in the 1945 session, which was finally defeated. The proposed tax is in addition to all other levies by the state against natural gas. Excluded from the proposed tax are:

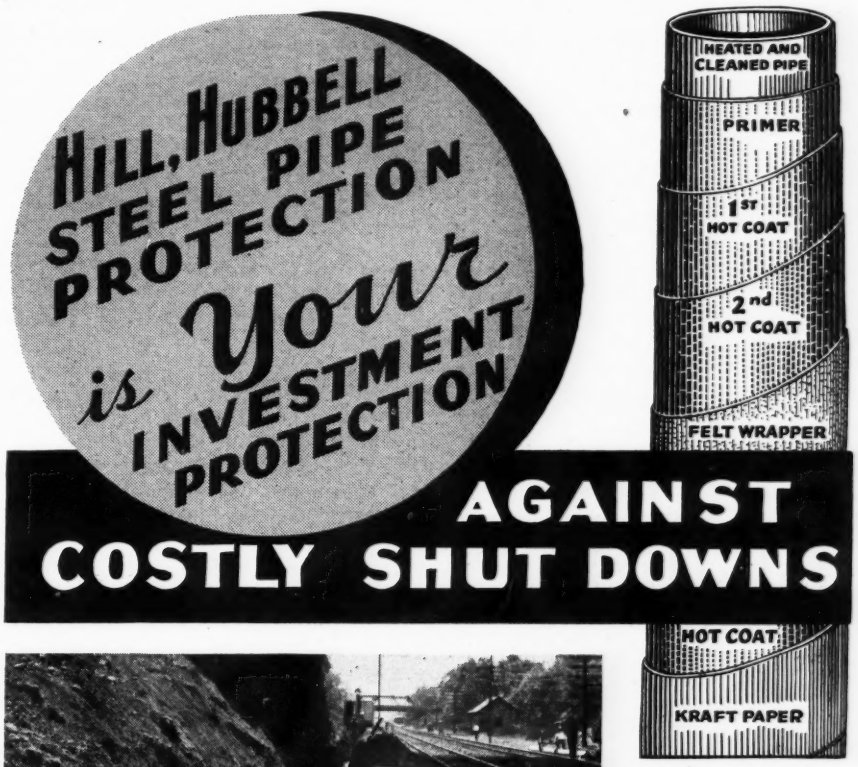
1. Gas injected into the earth for the purpose of lifting oil, storing, recycling or repressuring.
2. Gas used for fuel in connection with the operation and development for, or production of, oil or gas in the field where produced.
3. Gas lawfully vented or flared.
4. Gas used in the manufacture and processing within the state.

For the purpose of levying the tax, the gas shall be measured at 16.4 psia. One per cent of the tax is to go to the Oklahoma Tax Commission to be applied on expense of collecting the tax. The remaining 99% is to go into the common school fund of the state.

El Paso Merger Planned

El Paso Natural Gas Co. directors have recommended merger with Western Gas Co., a wholly-owned subsidiary, and Gulf States Oil Co. The new company, to be known as Western Natural Gas Co., would engage in oil and gas production. The merger was to be approved by stockholders at the annual meeting in Wilmington, Del., on March 25.

It is contemplated that, if the merger is made, the new company will issue and sell $2.5 million of first mortgage bonds and $1.5 million of convertible debentures.



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Catalogs

• **Leslie Co., 92 Delafield Ave., Lyndhurst, N. J.**—Bulletin No. 464, "Engineering, Operating and Maintenance Data on Temperature Regulators and Controllers," shows construction details of each class or type of regulator or controller in large cross-sectional color illustrations. Included are sizing and capacity tables to guide the selection of the proper regulator or controller for specific applications, as well as instructions for installing, dismantling, operating, cleaning and assembling.

Bulletin 463, "Pump Governors," gives engineering, operating and maintenance data on pump governors for control of reciprocating, turbine and motor driven pumps. Both constant pressure and excess pressure pump governors are featured.

• **Cochrane Corp., 17th St. & Allegheny Ave., Philadelphia 32, Pa.**—Publication 3000 on "Hot Process Softeners" is a 67-page, color booklet telling the complete story of commercial treatment of water by the Cochrane organization. Every page contains photographs, charts, graphs or tables.

• **Pittsburgh Equitable Meter Division, Rockwell Manufacturing Co., 400 N. Lexington Ave., Pittsburgh 8, Pa.**—A new 12-page sales bulletin describes the recently announced Rockwell-Emco No. 00 gas meter. Details of construction are portrayed by group assembly photographs with explanatory captions. A capacity curve shows the volume characteristics of the unit when measuring manufactured, natural and LP-gases. Factual information, including dimensions and weights, is summarized in a specification table. A section is devoted to a technical discussion of the pressure case aluminum alloy of which the outer casing is made.

• **Dresser Manufacturing Division, Bradford, Pa.**—The No. 47 Catalog, consisting of 106 pages, was designed to help engineers, superintendents and purchasing agents. A Visual Index in the front of the catalog illustrates 36 principal pipe joining and repair products, together with brief descriptions of their uses and the page numbers on which details may be found. Complete data necessary to specify and order couplings for steel, cast-iron and other pipe are given. Boltless couplings and fittings for small pipe, copper tubing, and service connections are described, as are repair clamps and sleeves. Gasket information, facts on ordering, and tables of useful information are included. Copies available if requested on company letterhead.

• **Burrell Technical Supply Co., 1936 Fifth Ave., Pittsburgh 19, Pa.**—Bulletin No. 205 describes the Turner-Burrell adsorption fractionator, designed for light hydrocarbon analysis. The manufacturer states that the self-contained unit separates, identifies, measures, and collects the components of light hydrocarbon gas mixtures and records the analytical data.

• **A. W. Cash Valve Manufacturing Corp., 666 East Wabash Ave., Decatur, Ill.**—Bulletin No. 199 describes the Acme Type A-31 pressure reducing valve a small-volume valve tested by over 500,000 installations and designed especially for installations where space limitations are an important factor. The A-31 is claimed to be ideal for use on drinking fountains, water coolers, humidifiers, beer pumps, gas refrigerators, spray paint outfits, air lines and similar services using water and air. Other liquids and gases can be used if recommended by the factory. If standard units are not suited to particular pressure problems, the company's engineering department will attempt to work out an individual solution.

• **The Foxboro Co., Forboro, Mass.**—Bulletin 397 describes the Dynalog Electronic Recording Pyrometer, which has no galvanometer, slide wire or dry cell, and requires no standardizing. Because of the instrument's continuous balancing action, the recording pen can traverse the full width of the chart in one second's time. Sensitivity is 1/10 of 1% of the full scale range. For temperature measurement, the instruments are available with ranges between —200° and +2800° F. They are also in use for the measurement or control of humidity, force, strain, pH, speed and many other process variables, according to the manufacturer.

• **American Radiator & Standard Sanitary Corp., P. O. Box 1226, Pittsburgh 30, Pa.**—A new Warm Air Heating Section has been issued as a supplement to the American-Standard general catalog. The new section is being released to wholesale distributors, the heating trade, architects, contractors and builders. Illustrated in full color, the 62 pages outline capacities, dimensions, and other essential data in tabular form, making the Warm Air Heating Section a handy reference book and helpful guide for selecting warm air heating equipment and for writing specifications and preparing layouts.

• **Fischer & Porter Co., Hatboro, Pa.**—"Dimension Drawings for Series 700 Flowrator" presents for the first time a complete set of certified dimensions covering every available combination of the firm's Flowrator instrument. The book is devoid of all sales information in an effort to reduce to the handiest possible form, comprehensive and accurate dimensional information for the piping layout draftsman. The book is available for limited distribution to all engineers who are called upon to design piping layouts utilizing flowmeter installations. Copies may be obtained upon request by writing to Department 4E-A.

• **The Reliance Electric & Engineering Co., 1076 Ivanhoe Road, Cleveland, Ohio**—This firm has published two recent bulletins on "Series C" induction motors. Bulletin C-118 covers protected (open type) frame sizes 203 to 326, with ratings from ½ to 20 hp, 600 to 3600 rpm. Construction details, including all-steel frames, welded cores, aluminum pressure-cast rotors, and the Reliance precision bearing mount, are described.

Totally-closed, fan-cooled motors are featured in Bulletin C-125, which deals with squirrel-cage frame sizes 224 to 326, for two and three phase a.c. circuits.

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Connelly Valves, Governors, and Manometers are now manufactured and sold only by Norwalk Valve Co., South Norwalk, Connecticut. Connelly will, however, continue to manufacture and sell Gas Purification Equipment including Connelly Iron Sponge, pH Kits, Caloroptics, and BTU Control equipment in connection with propane and butane.

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